COPPER RIVER WATERSHED PROJECT

Upriver and down, salmon are common ground

Green Infrastructure Final Report

1) Description of overall accomplishments and impacts:

The Copper River Watershed Project (CRWP) successfully designed and distributed stormwater education and outreach materials. The materials focused on the negative impacts polluted stormwater can have on the local environment. The education and outreach component of this grant supported the overall efforts of utilizing green infrastructure in Cordova to foster a healthier aquatic habitat. We successfully partnered with three property owners to install a subsurface drainage system and clear debris from a small stream. This project will allow pollutants to filter out of stormwater and allow clean groundwater to flow to the drainage stream with limited interchange with surface water. Finally, two local construction companies supported the CRWP in our efforts to decrease pollutants in stormwater. Wilson Construction and Eagle Contracting donated their time, equipment, and materials to clear out a buffer zone adjacent to drainage streams on their property. Once the area was cleared they installed a 5-foot wide vegetated buffer.

2) Vegetated buffer

a) Design implemented at Wilson Construction and Eagle Contracting

Both Wilson and Eagle will install a 5 foot wide vegetated buffer on their properties. Engineers at DOWL Engineering determined that a 5 foot wide buffer, with no elevation gain, will allow stormwater to properly drain from the properties. The vegetated buffer with boulders will provide an area that slows the movement of stormwater and aids in the filtration of pollutants.

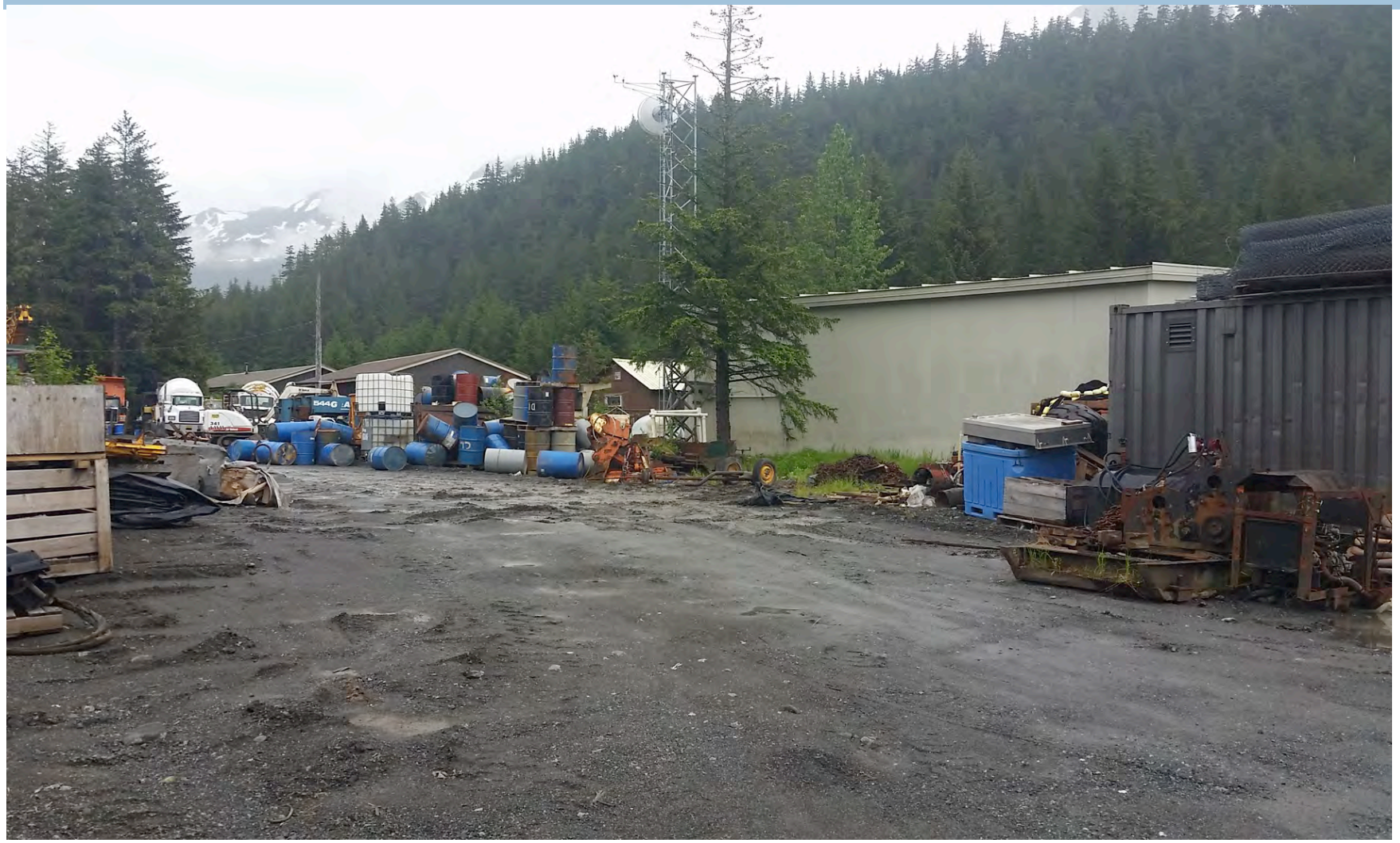
The 5 foot wide buffer zone has:

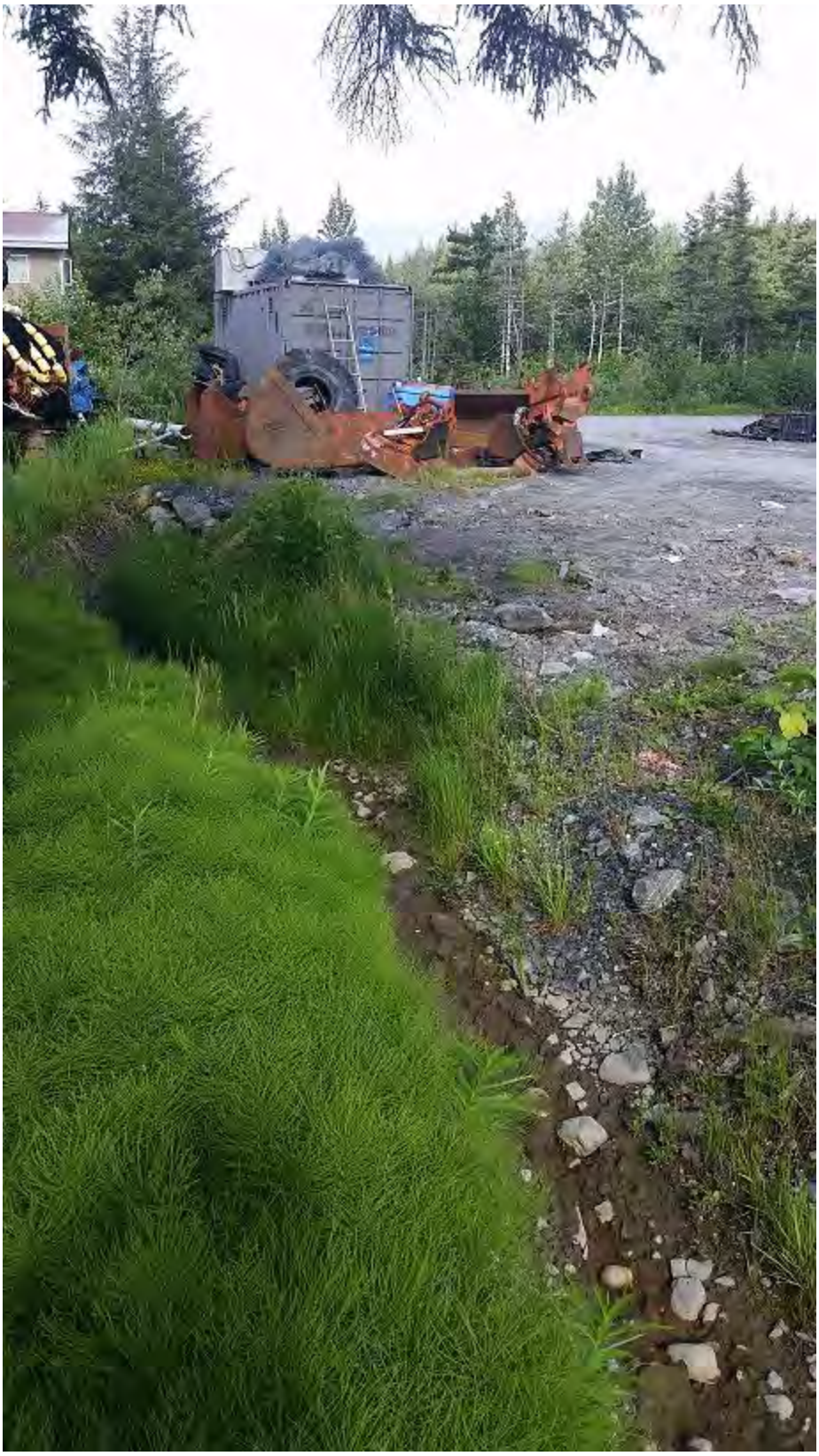
- no elevation gain
- no equipment or materials stored within the buffer area
- knee-high boulders along the property side to properly mark the bufferzone
- top soil laid within the buffer zone boundry
    - precautions taken while placing top soil near streams
- seeded with the following grass mixture
    - 60% 'Nortran' Tufted hairgrass
    - 30% 'Arctared' Red fescue
    - 5% 'Egan' American sloughgrass
    - 5% Annual ryegrass

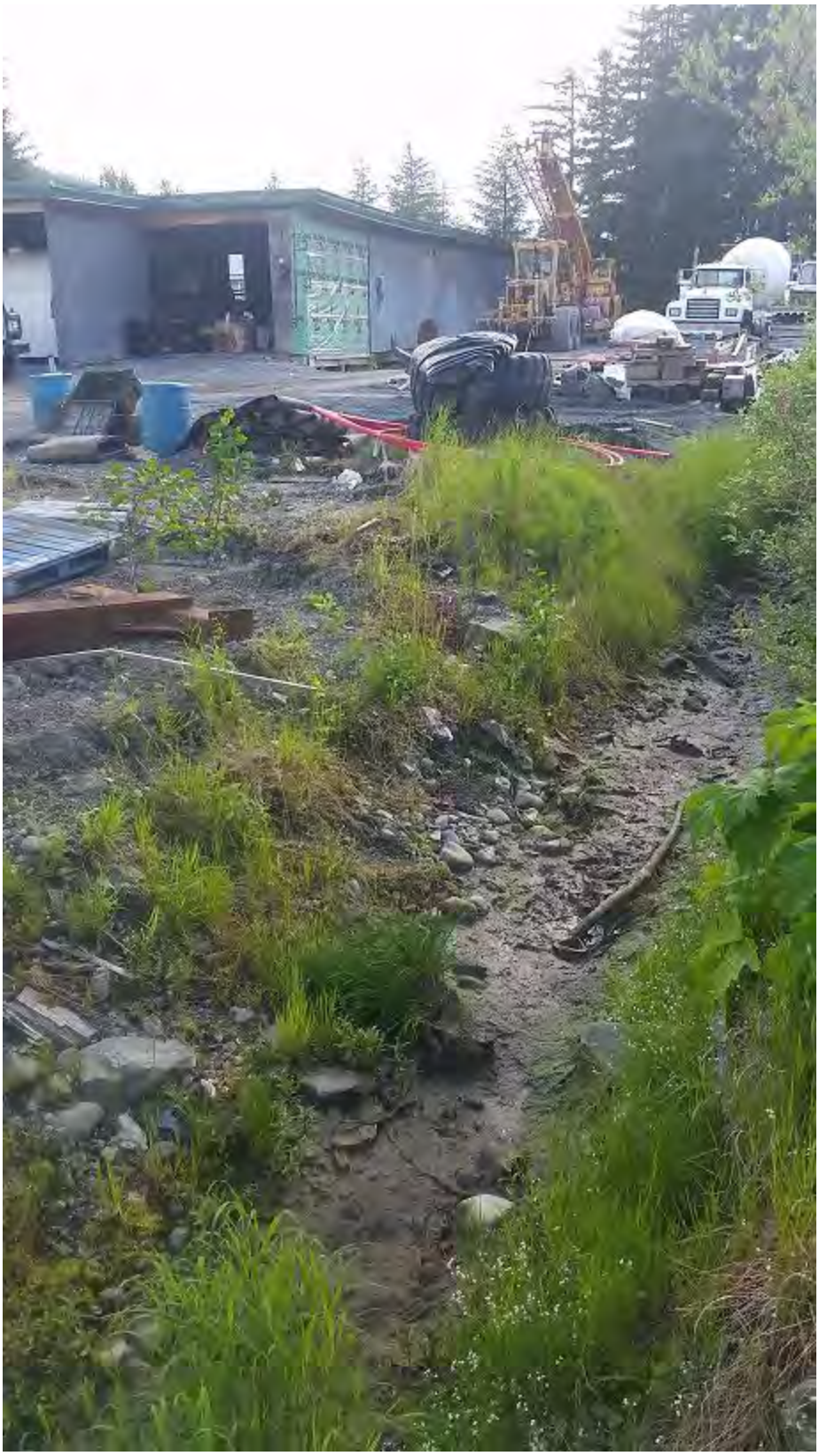
b) Before and after (24-hour period after a significant rainfall) photos from Wilson Construction

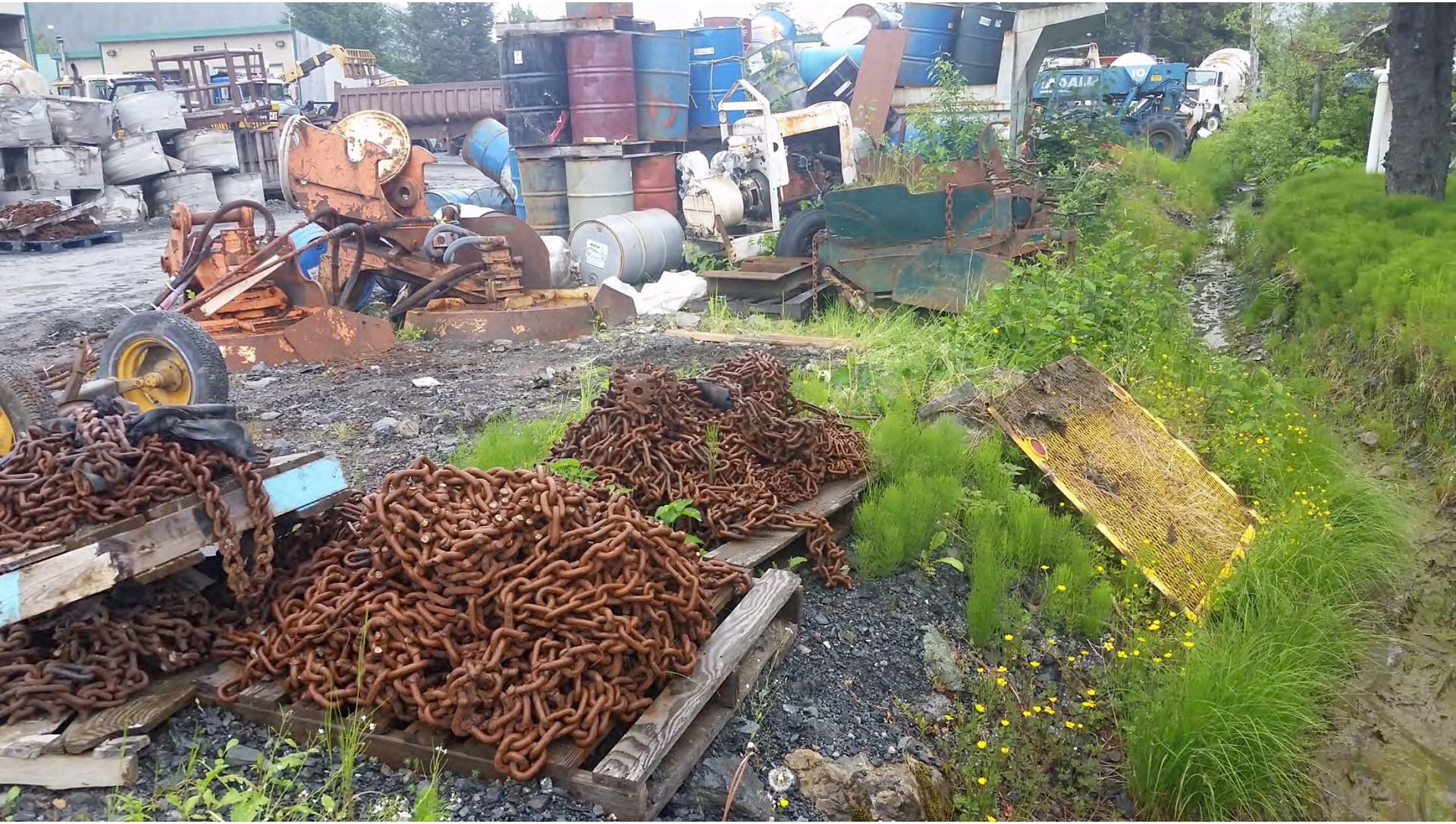
*See pictures attachment – no significant rain event as of July 15, 2017

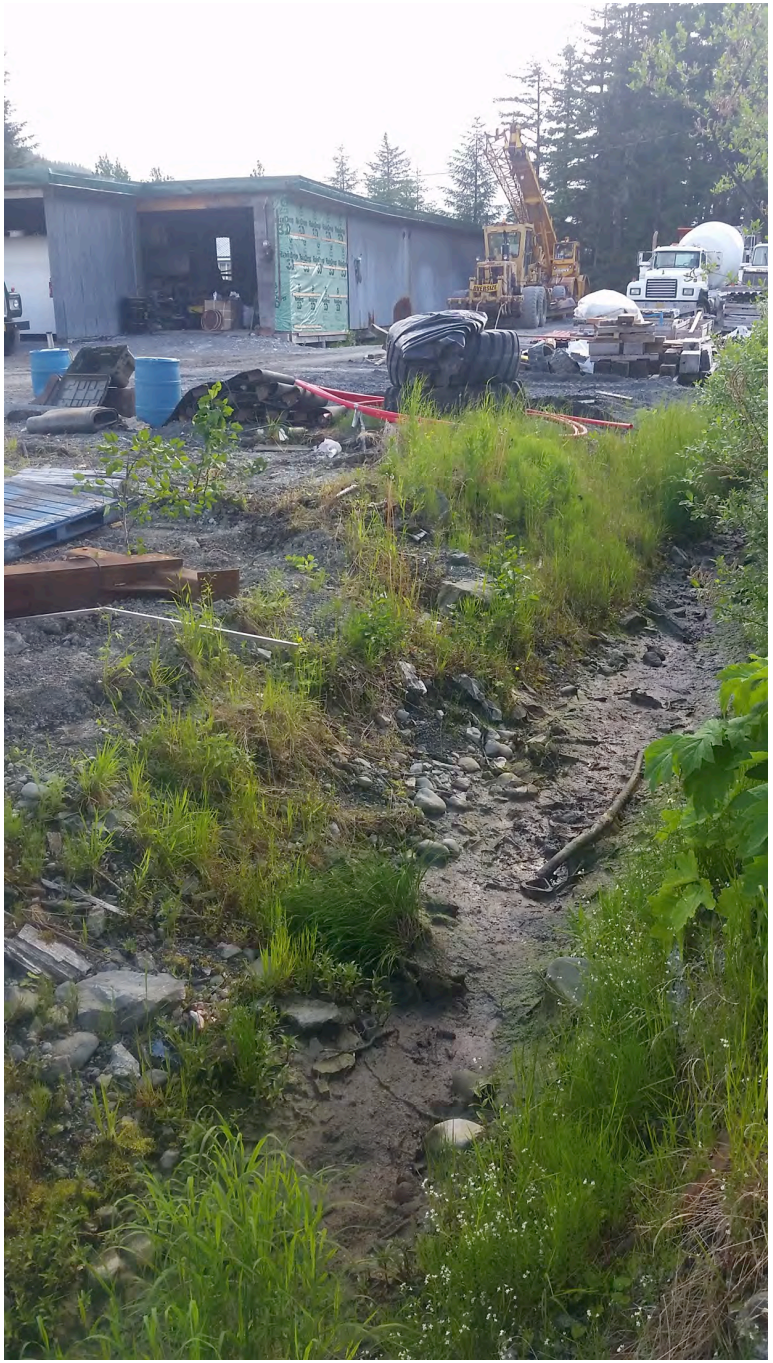
Wilson Construction Buffer in Progress

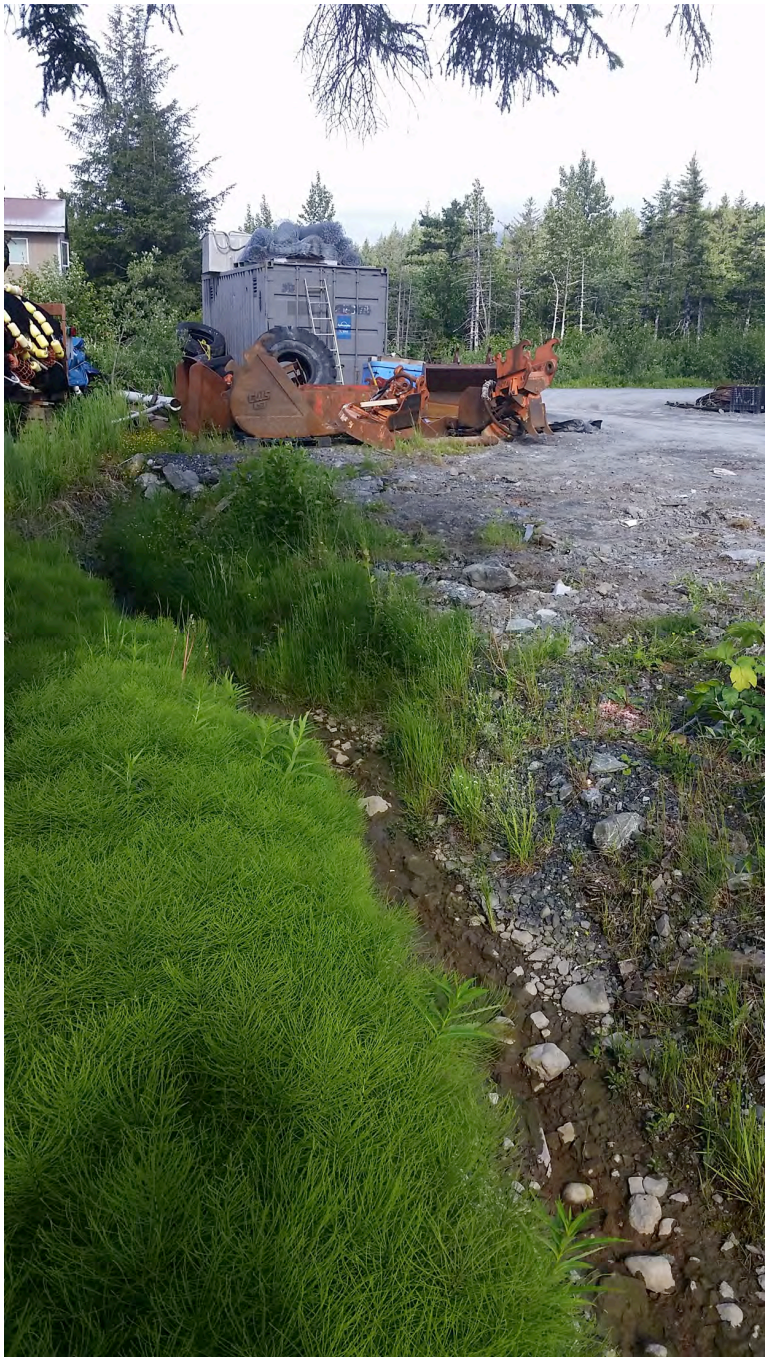




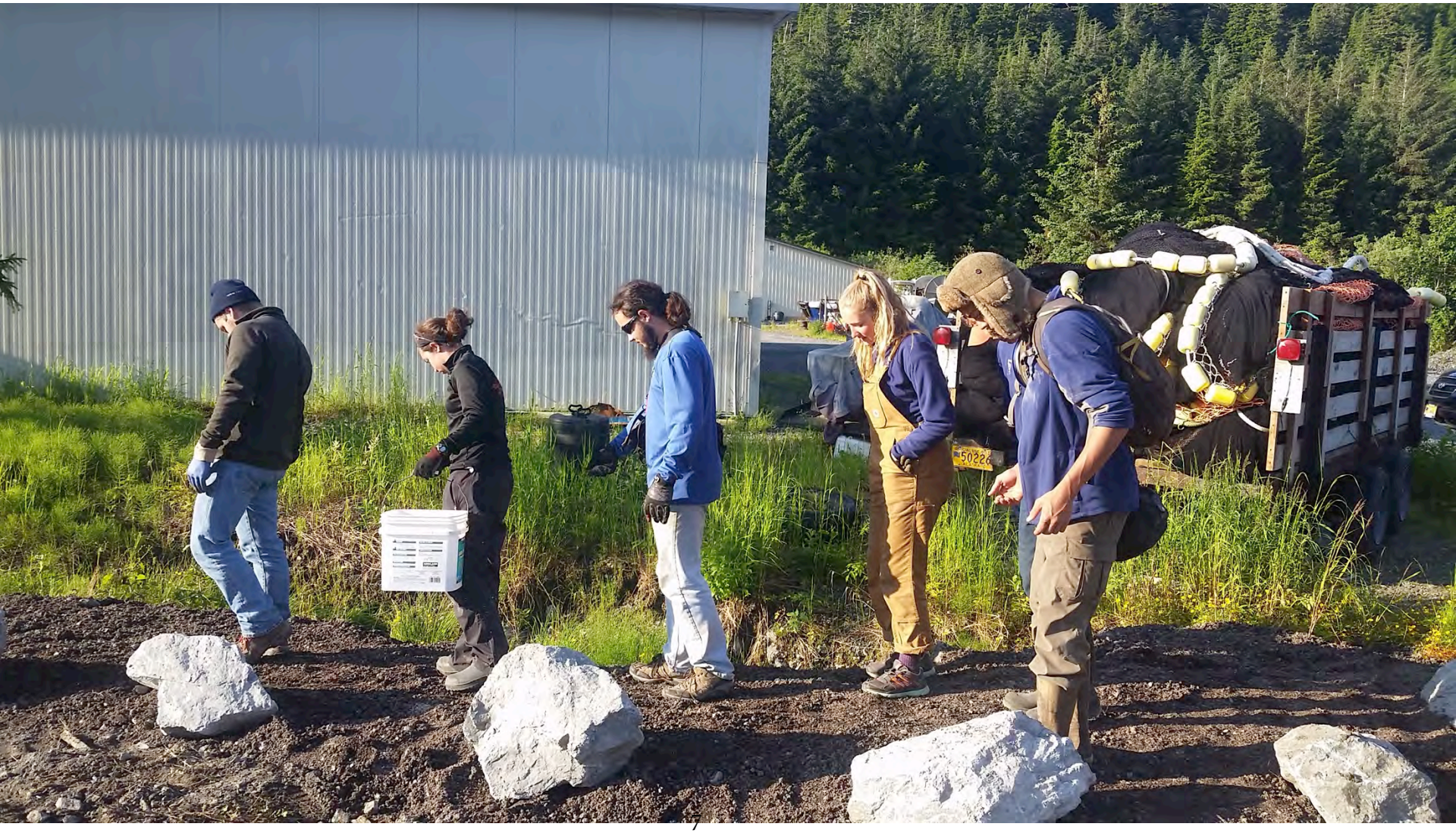


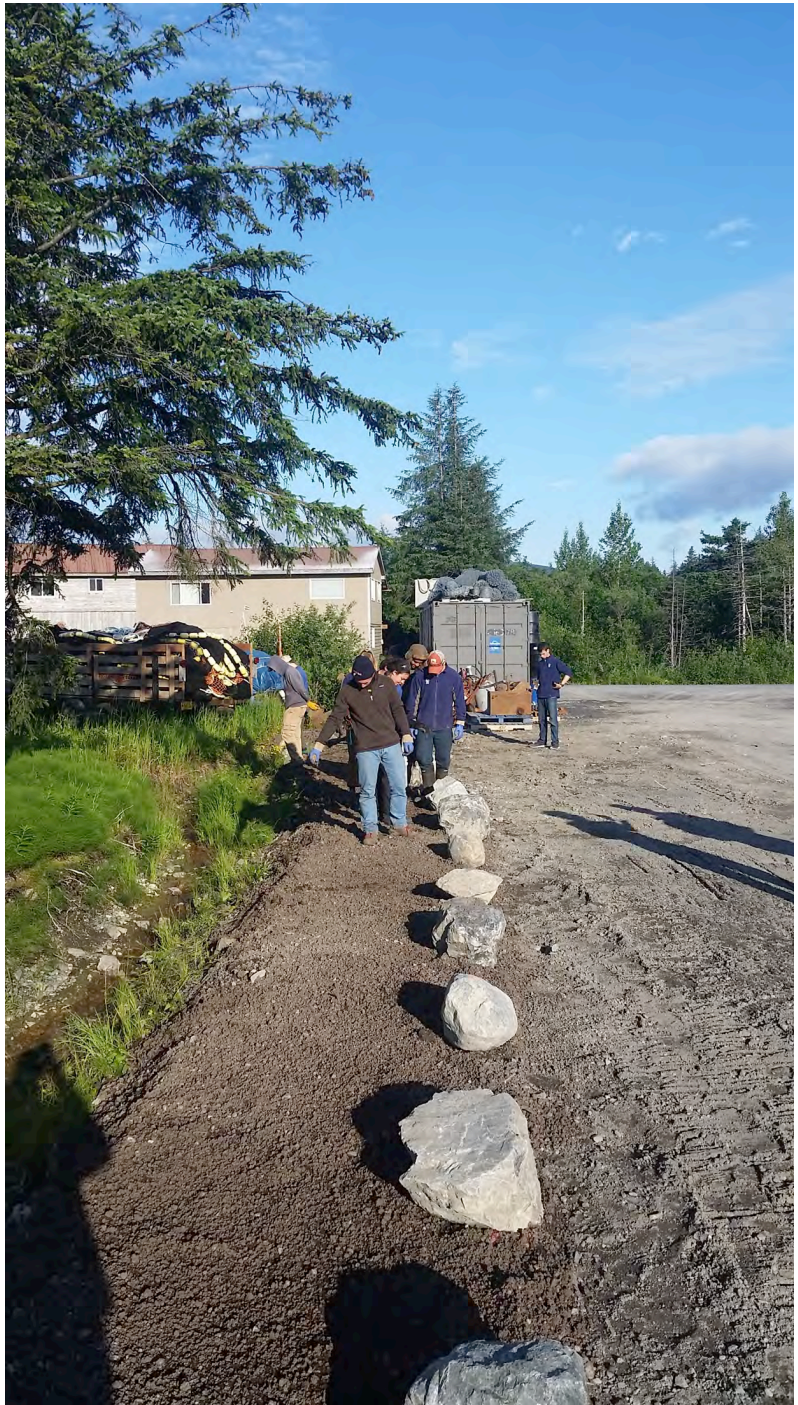


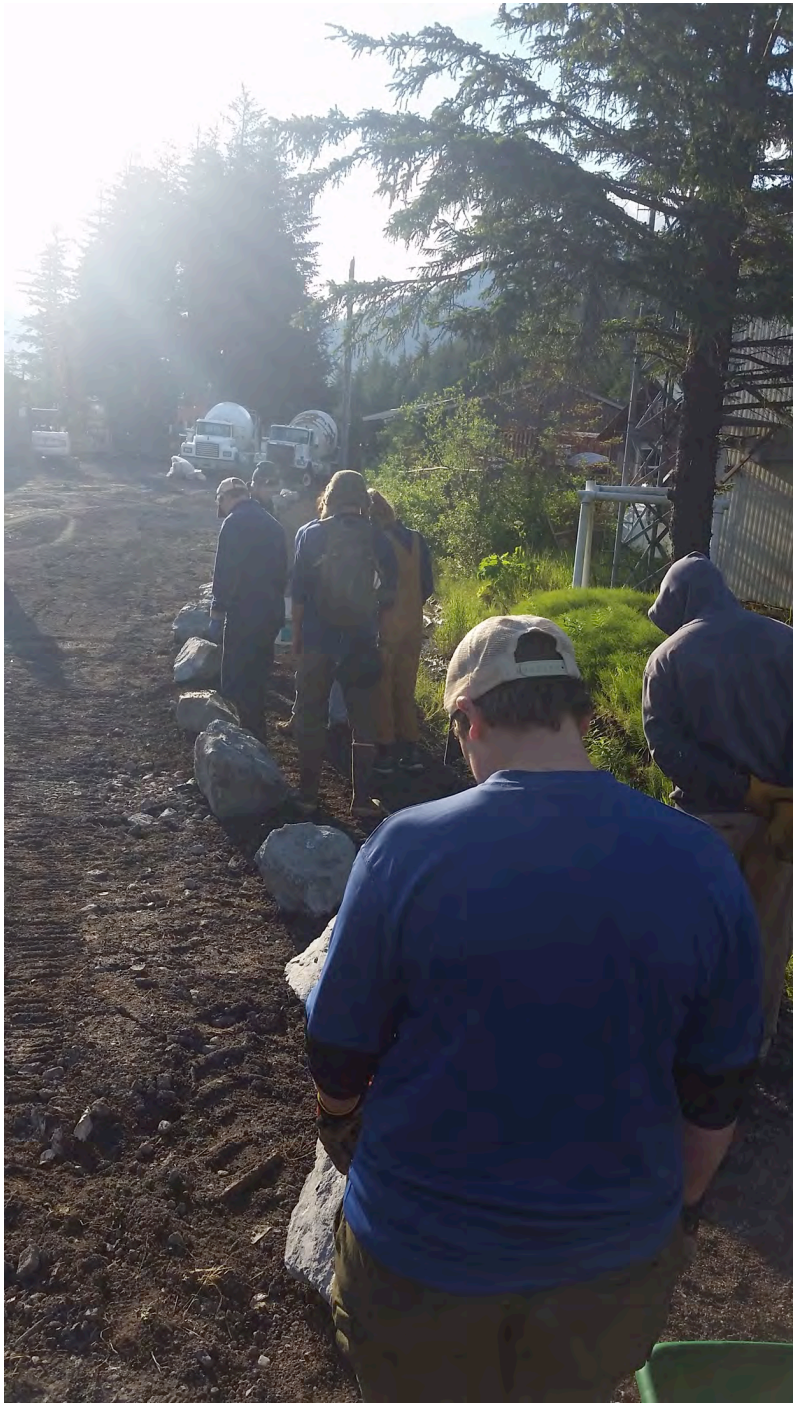


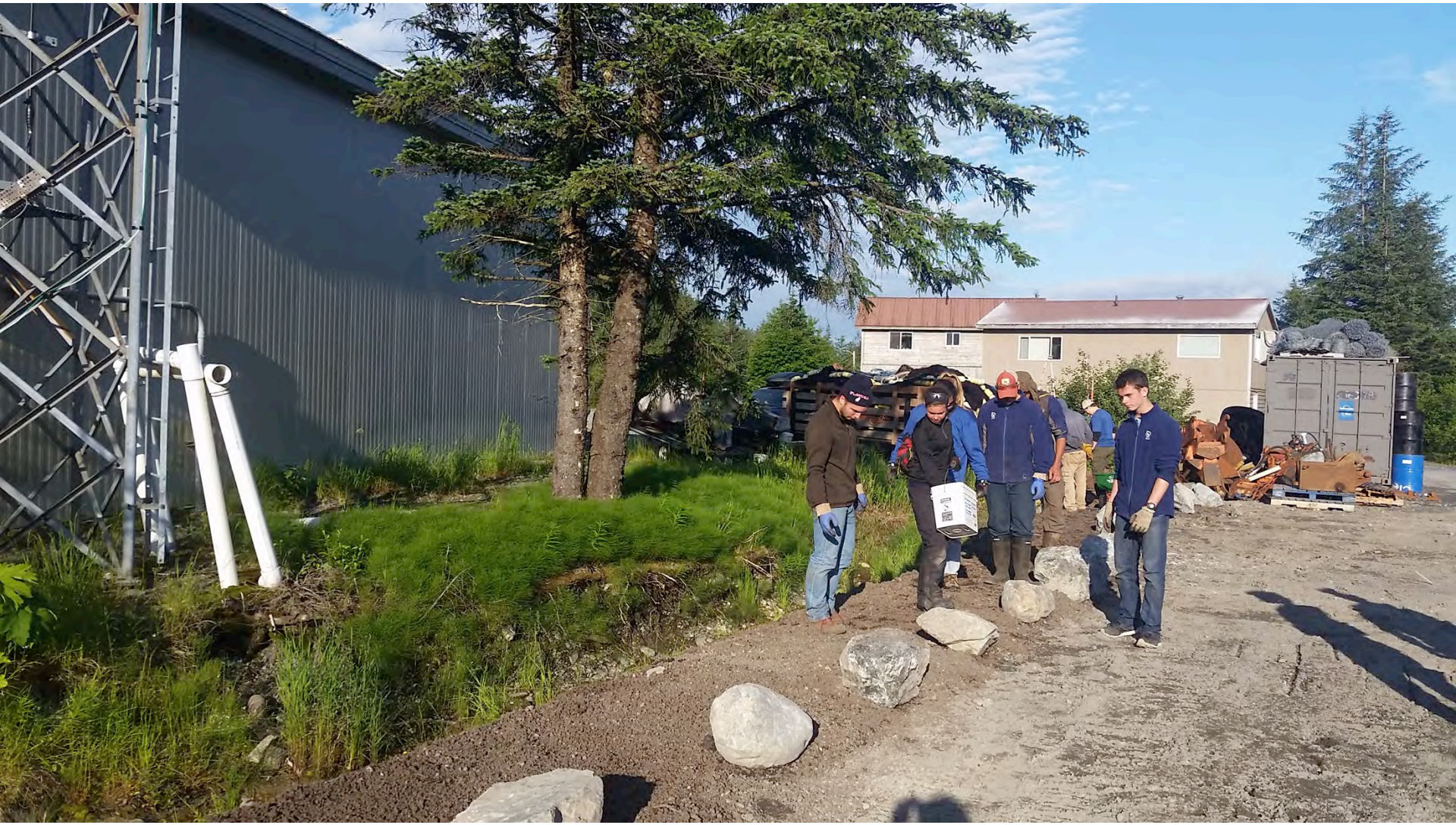


Volunteers spreading seed

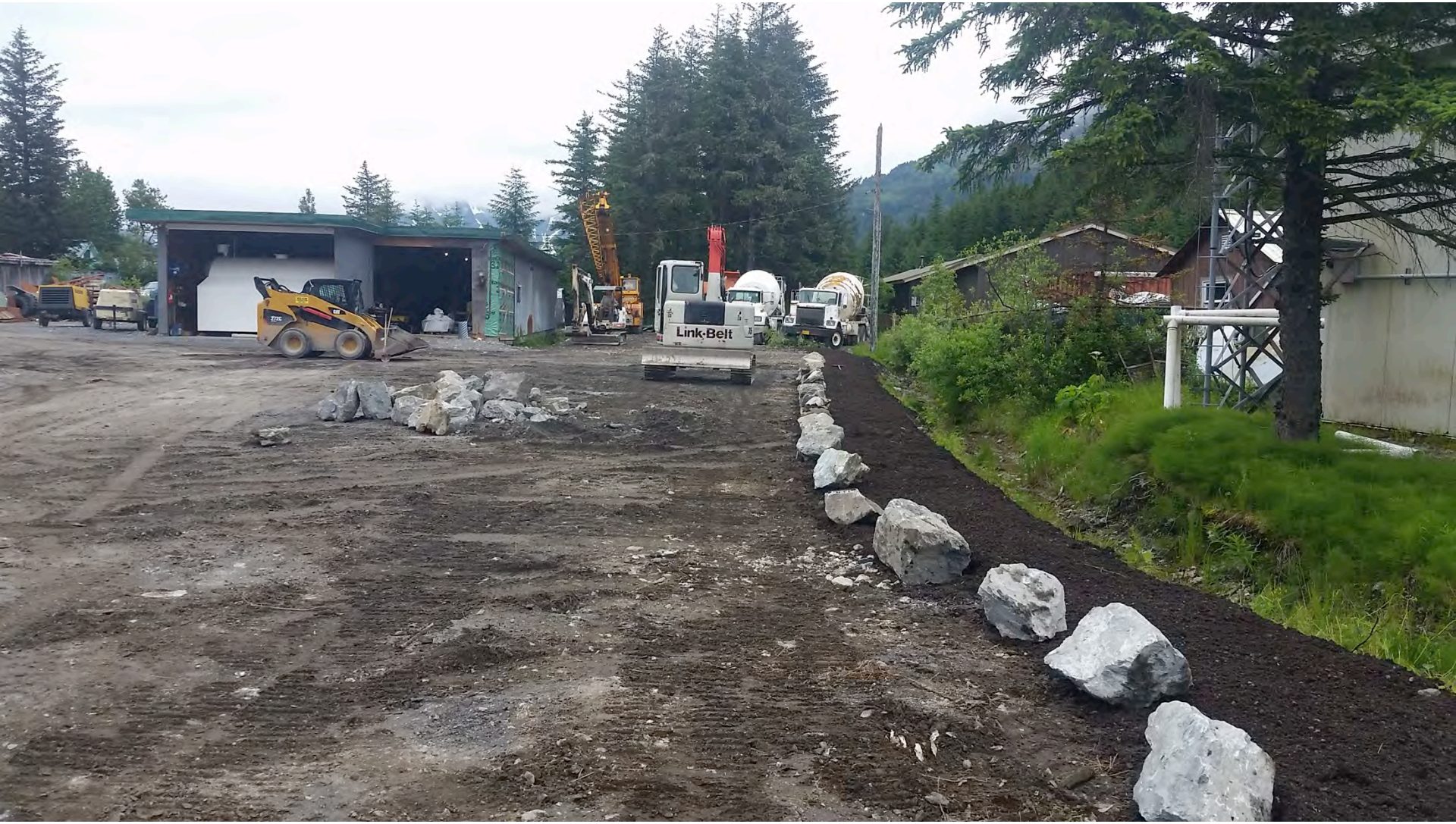


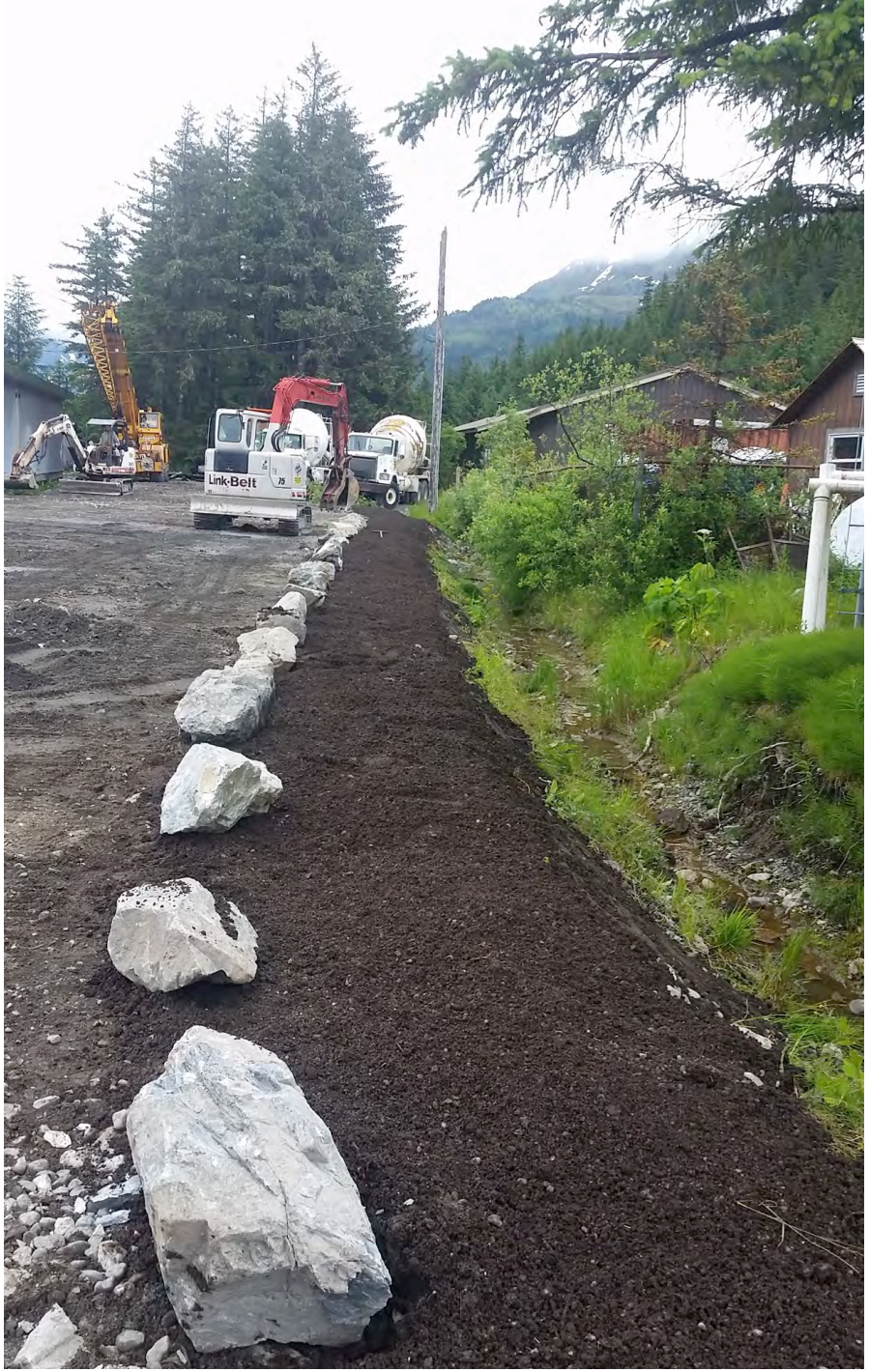






Wilson Construction Buffer Zone

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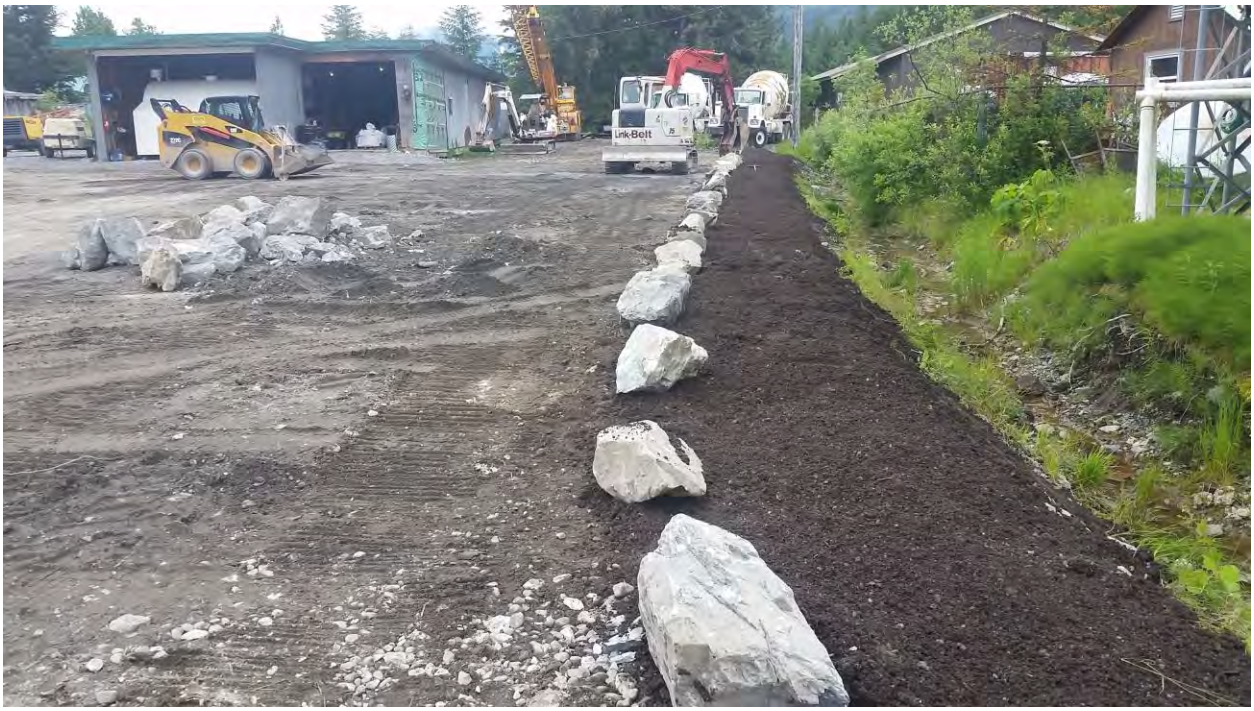
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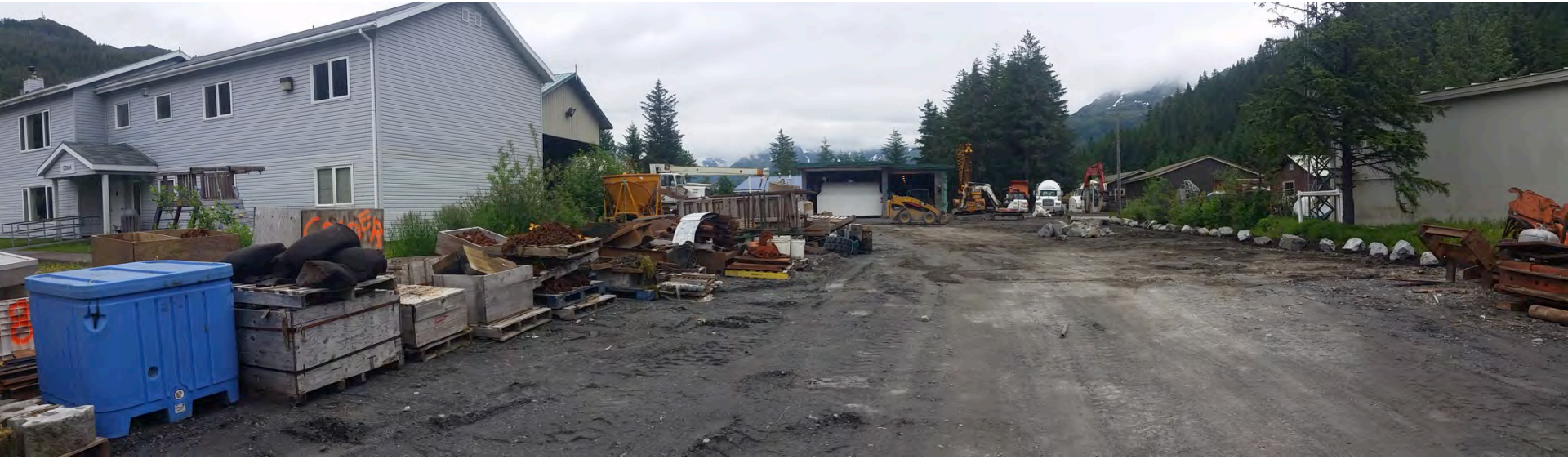
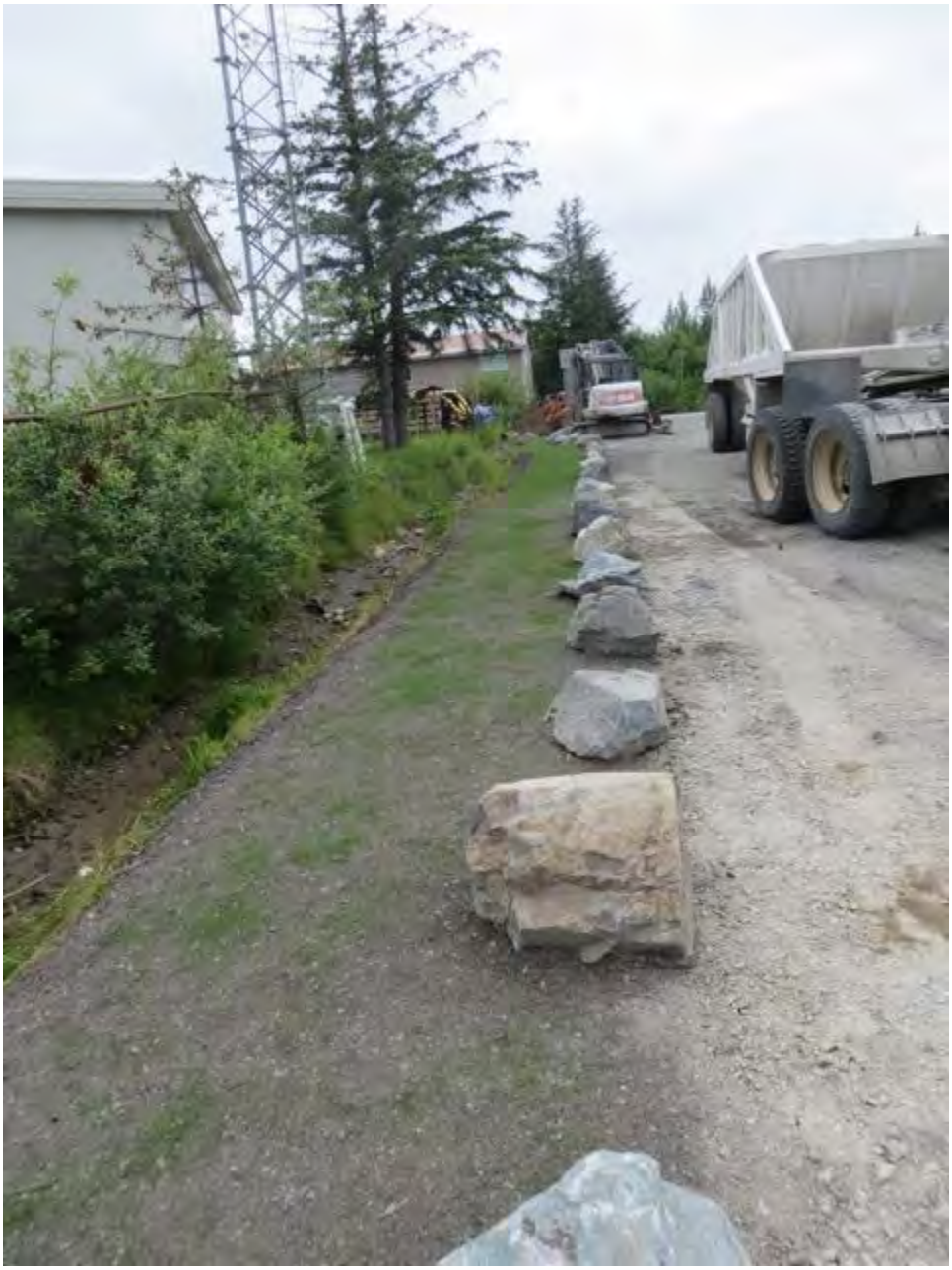
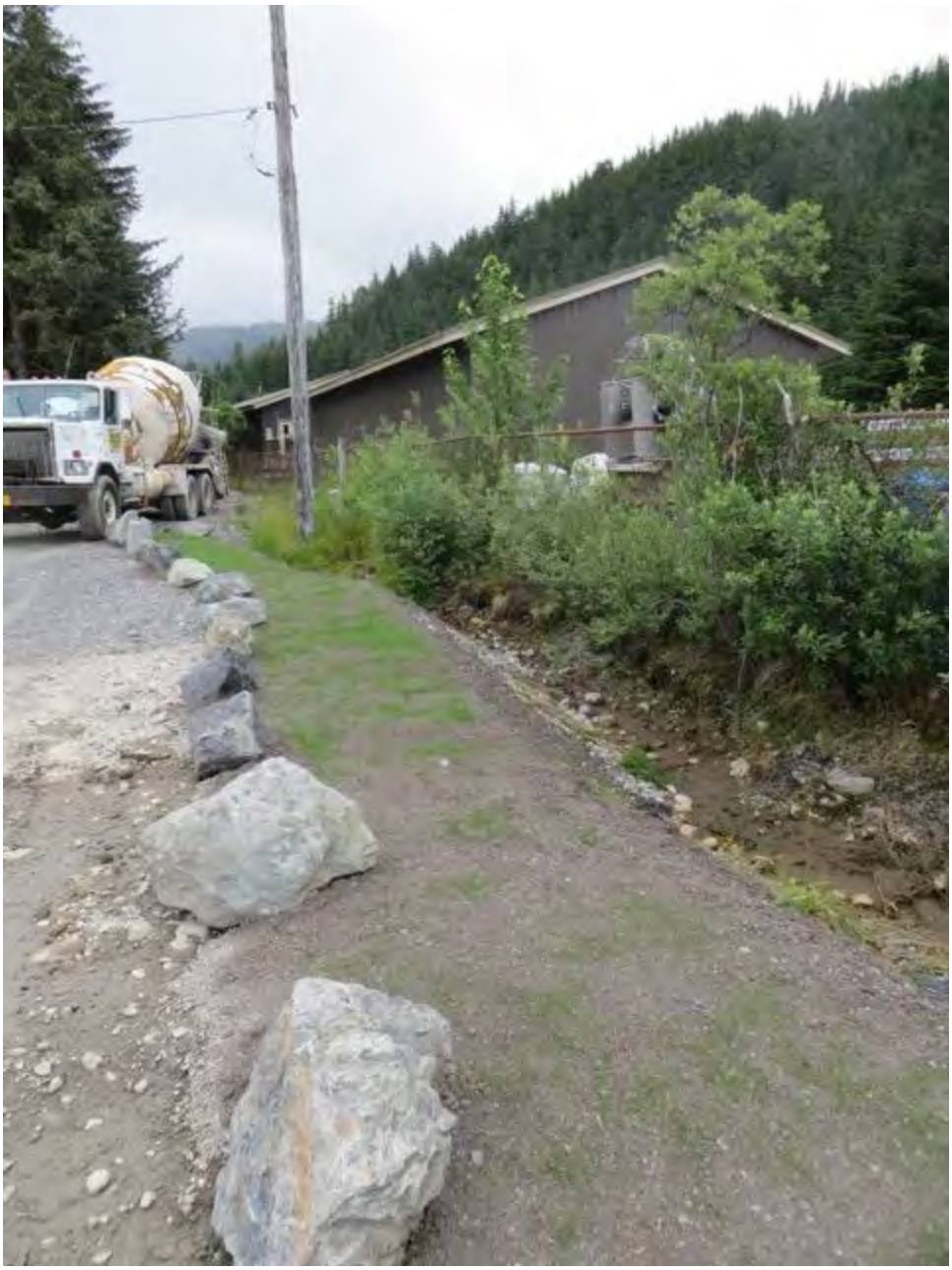




Photos of the buffer on the Wilson lot — grass is sprouting! Those two photos are taken from the same point, looking in two opposite directions ("downstream" and "upstream" on the drainage ditch).

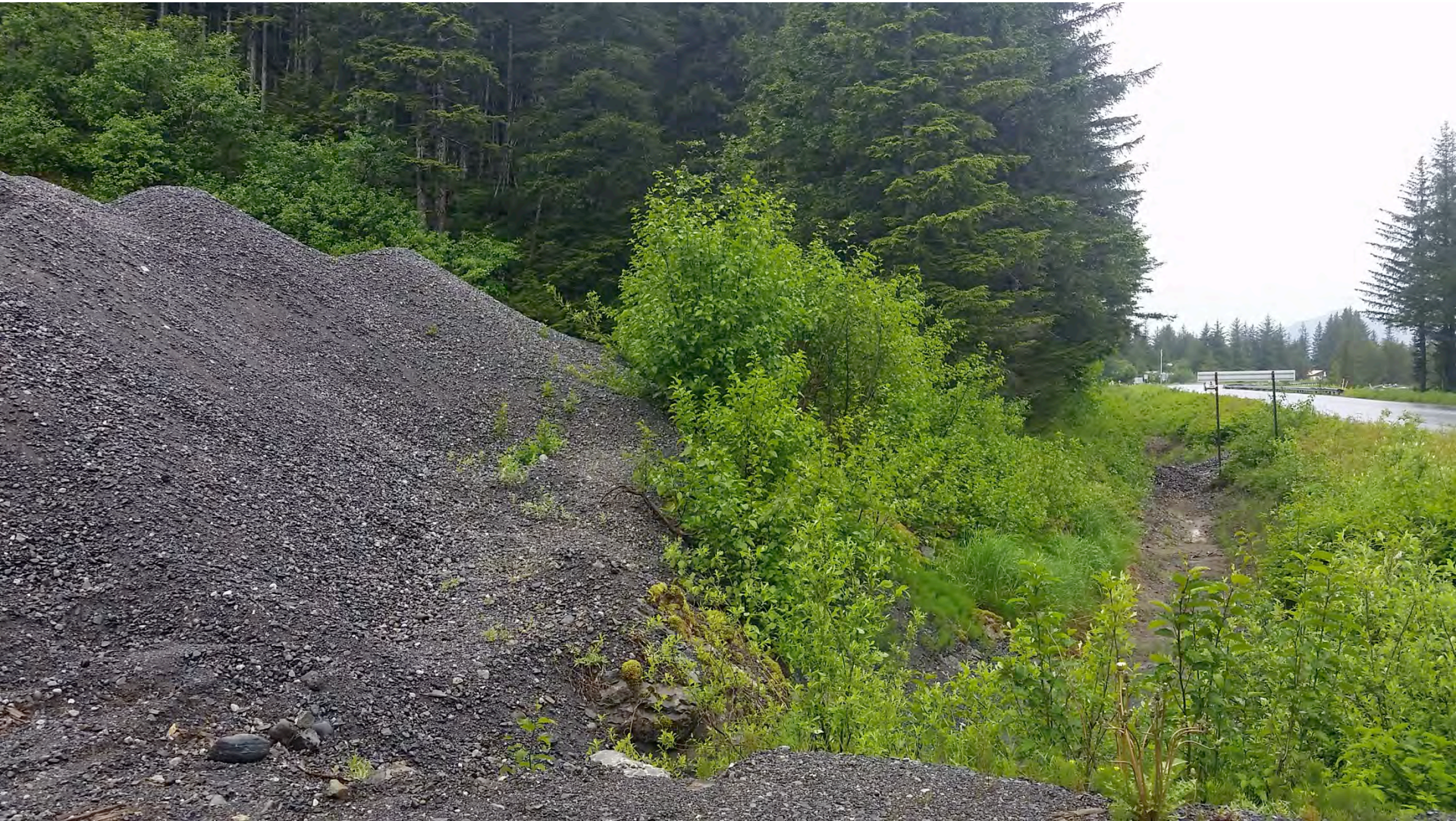


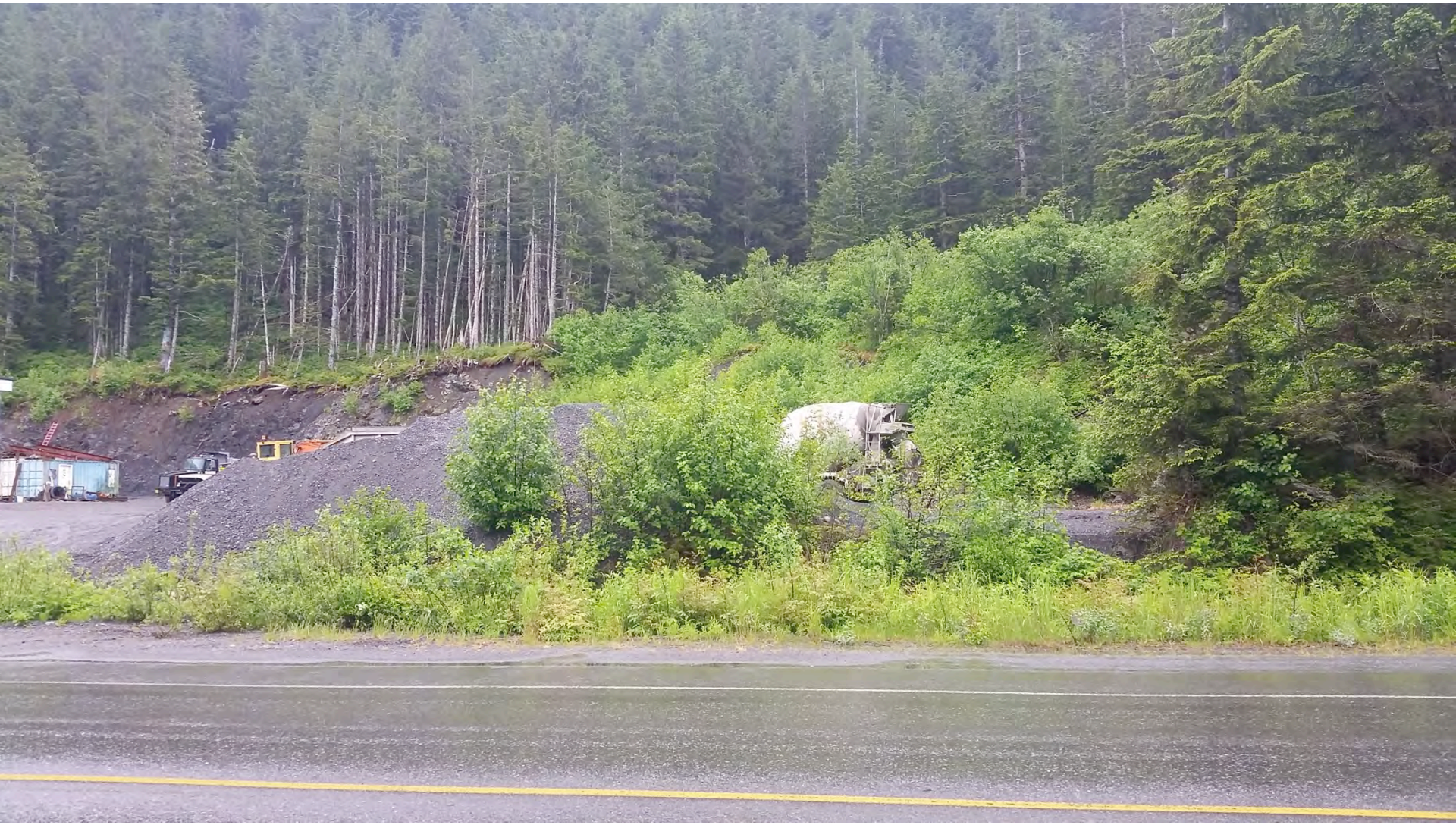
c) Before and after (24-hour period after a significant rainfall) photos from Eagle Contracting
*See pictures attachment – no significant rain event as of July 15, 2017

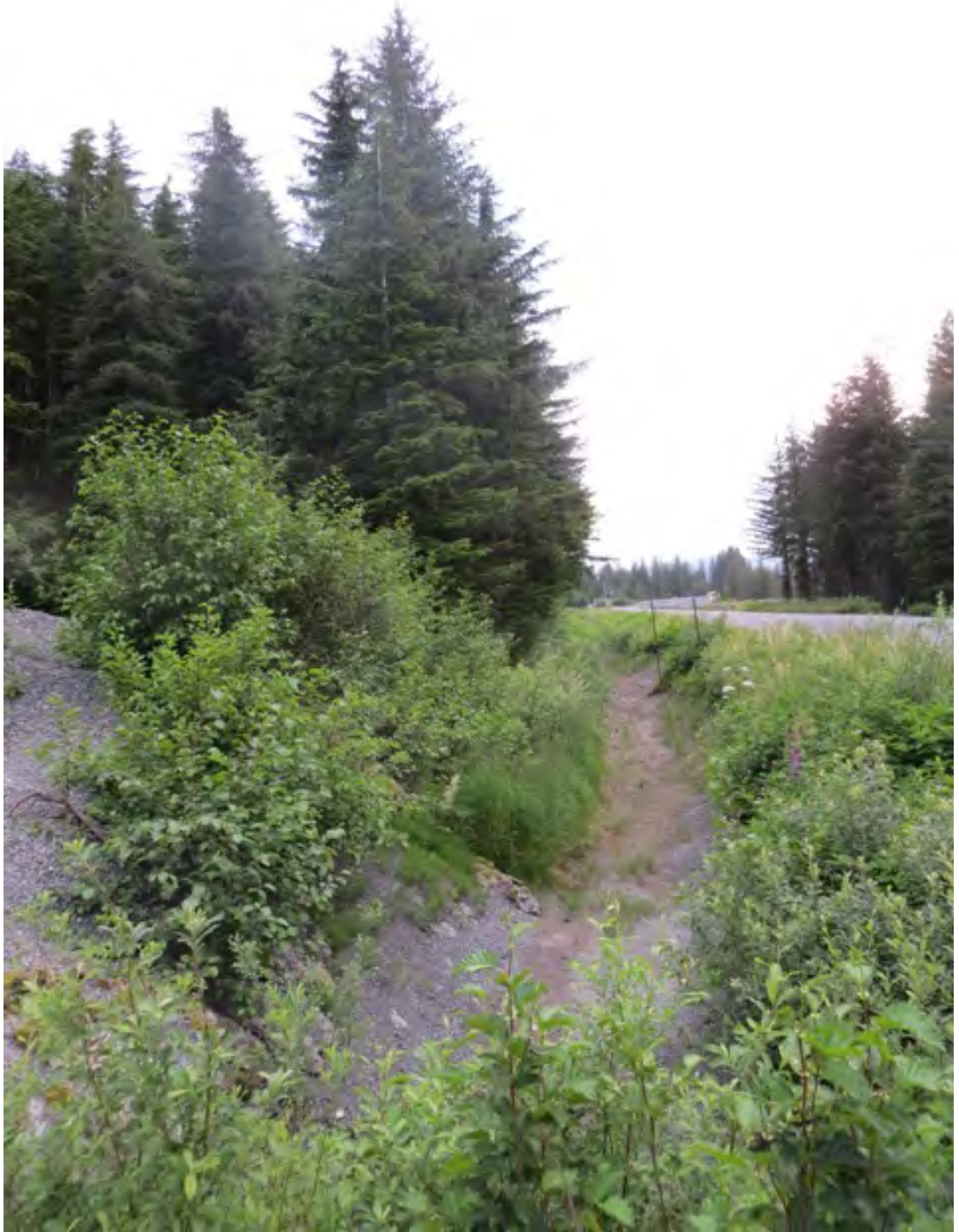
d) Description of overall accomplishments and environmental impacts of installed buffer zones and Wilson Construction and Eagle Contracting Eagle Contracting and Wilson Construction donated their time, equipment, and materials in clearing and creating a five-foot buffer zone adjacent to local drainage streams. Before partnering with the CRWP, the construction companies had equipment (containing oil and gas), metal materials, and gravel fill within a foot of the streams. These pieces of equipment and materials can leach harmful compounds into the stream, which are transported to Odiak pond. The construction companies removed the equipment and materials and cleared out a five-foot wide buffer zone. They laid down topsoil and boulders to mark the area. Volunteers helped spread a seed mixture throughout the buffer zone. The seed mixture contains grasses that have sturdy roots in order to keep soil in the buffer zone, even in wet conditions. The buffer zone now provides a section of vegetated soil for water to pass before entering the stream. As surface water runs over the buffer zone, pollutants will settle out, allowing clean surface water to enter the local drainage stream.

The successful completion of 2 buffer zones not only impacts Odiak pond, but Cordova as a whole. The placement of green infrastructure on both construction lots will serve as a positive example for taking the extra step towards cleaner stormwater.

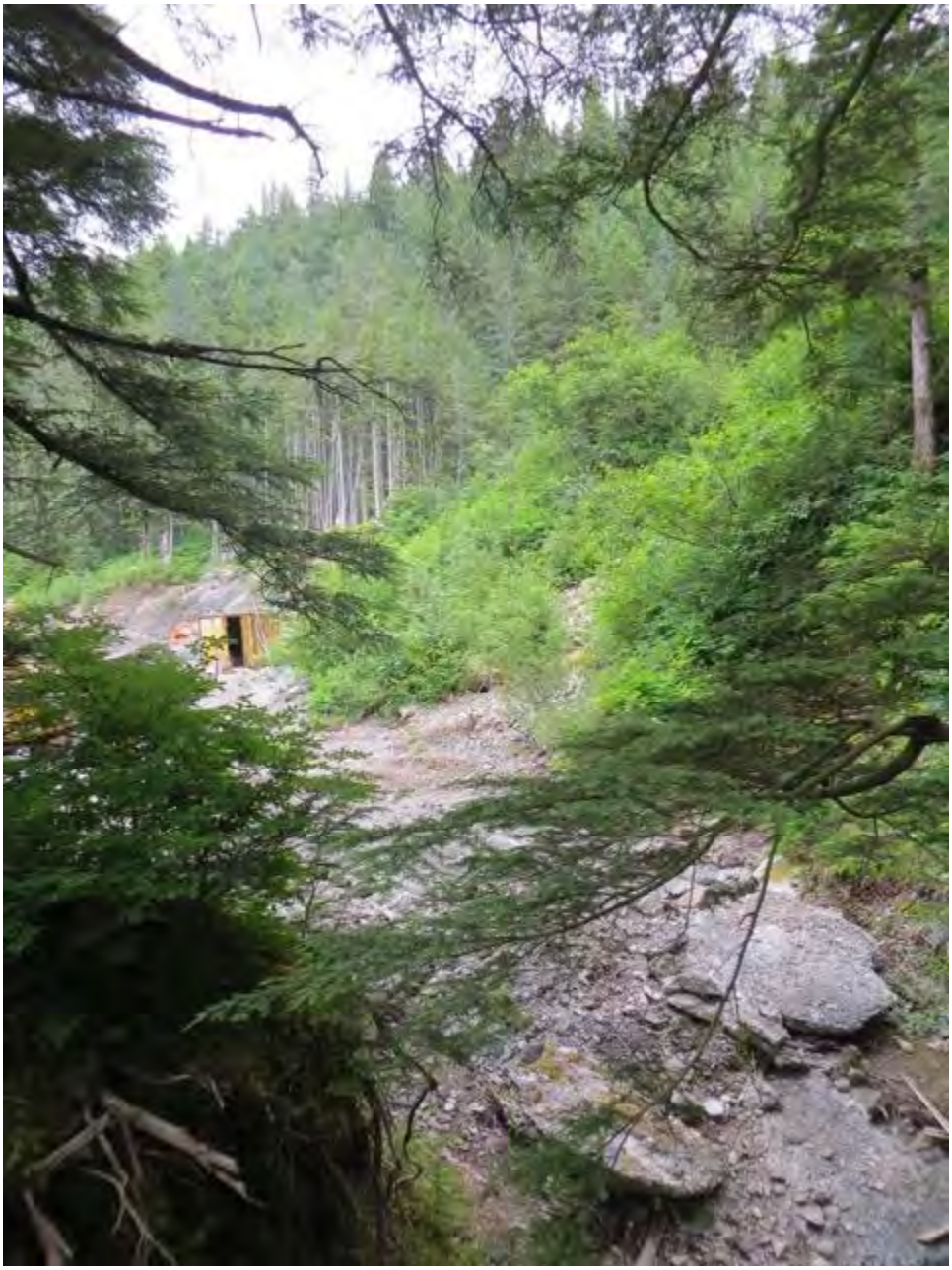
Eagle Contracting Buffer in Progress



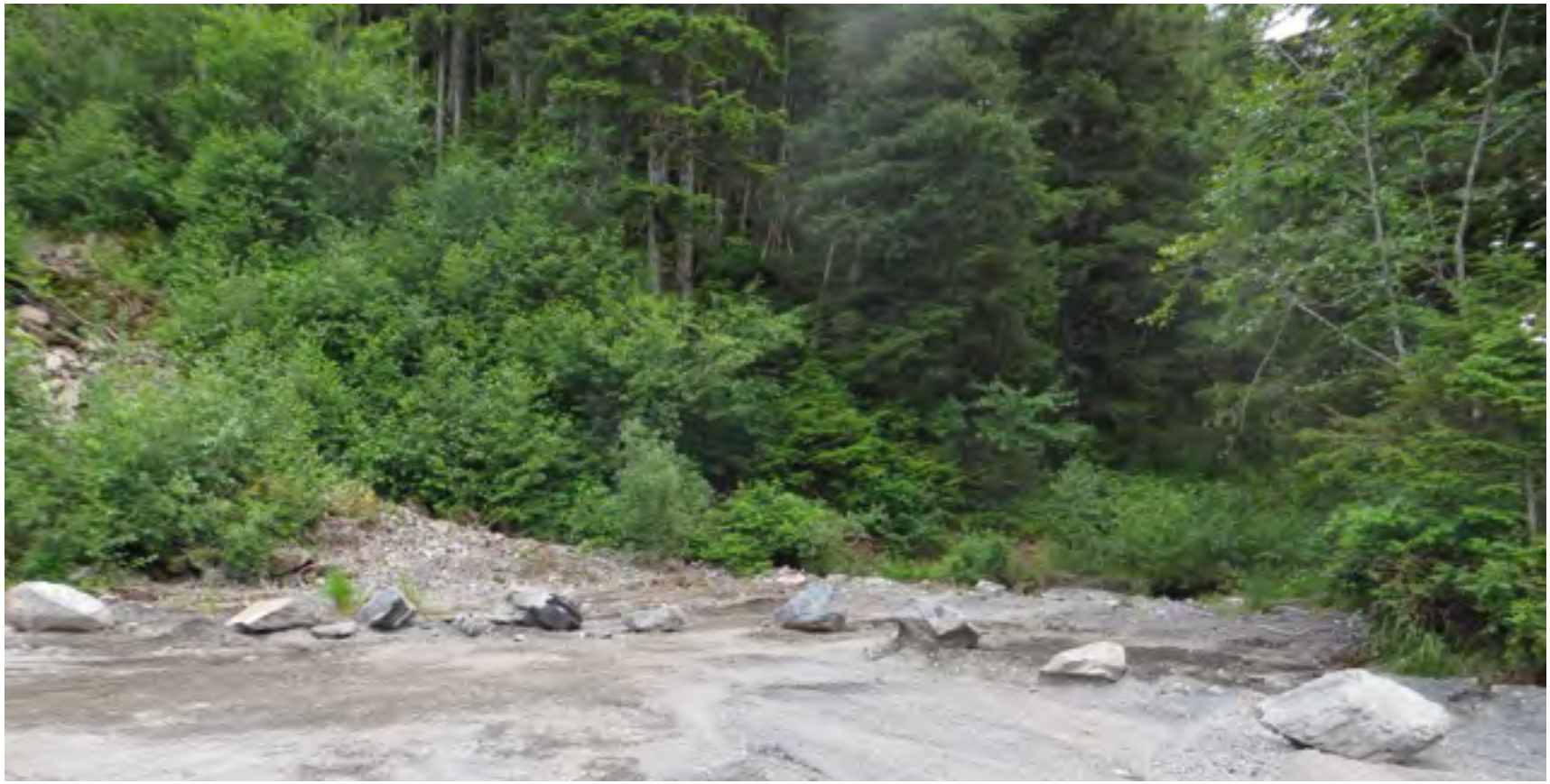


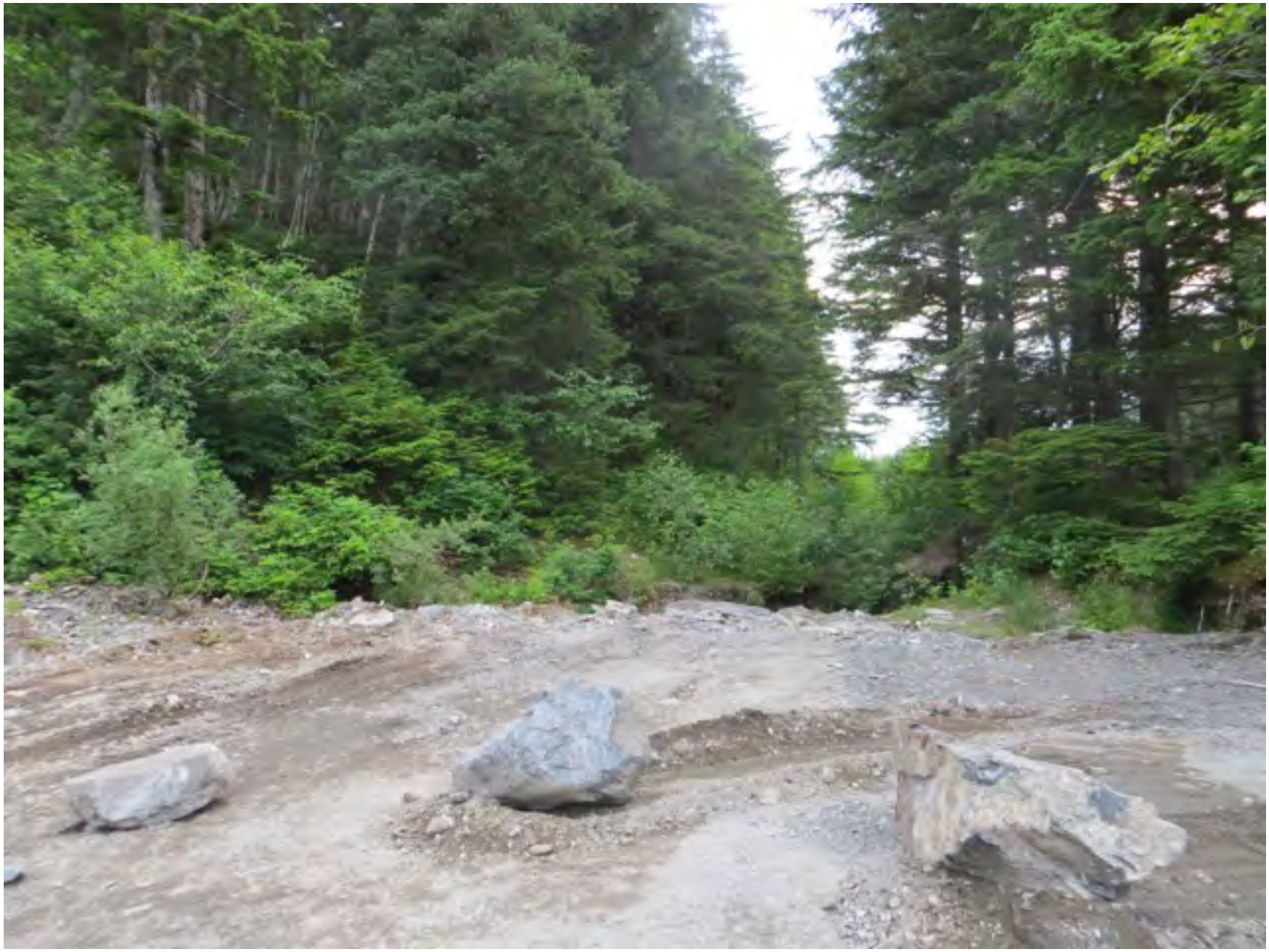


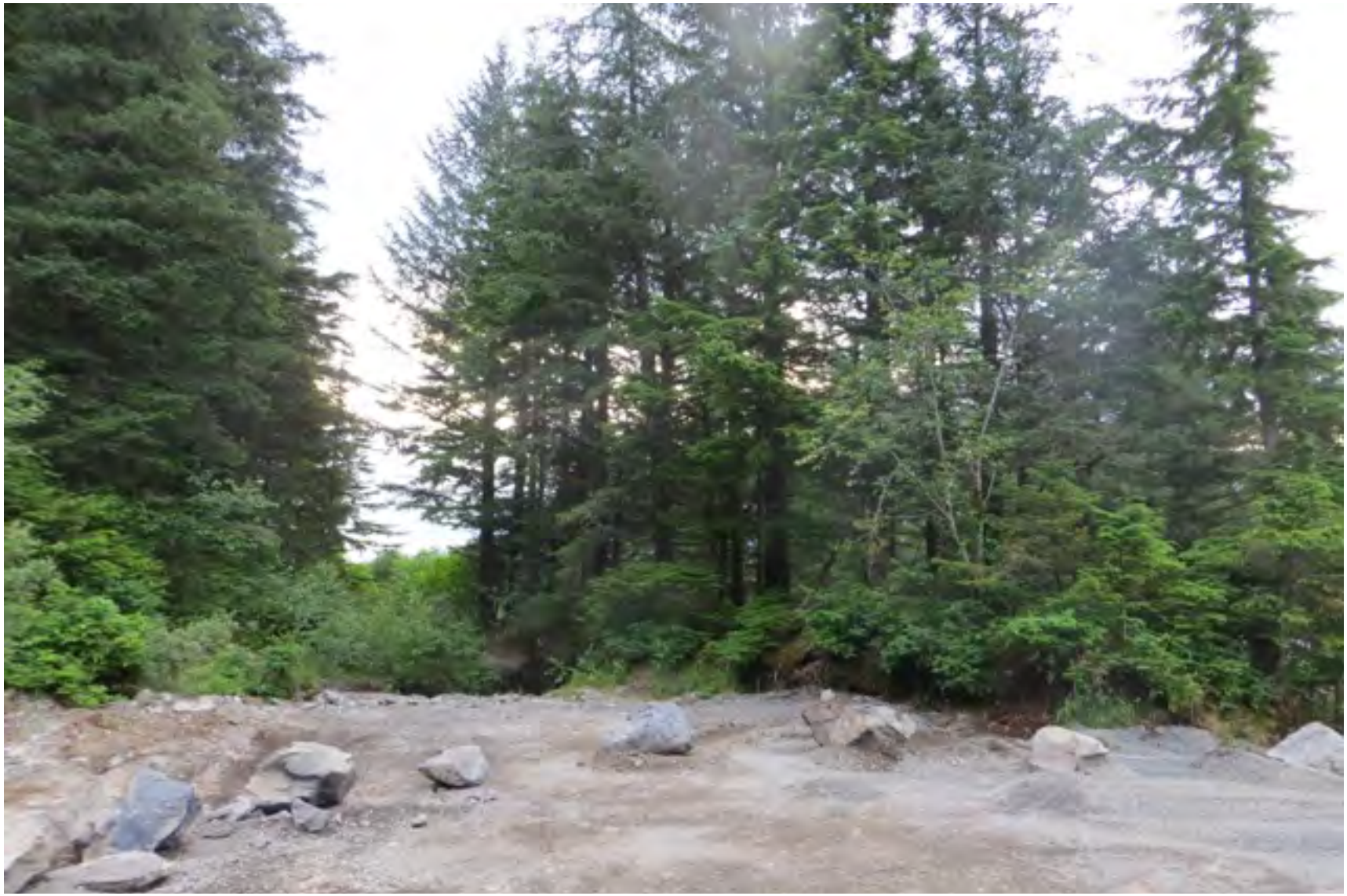
“After” photo of Eagle Contracting’s yard



Eagle Contracting Buffer Zone



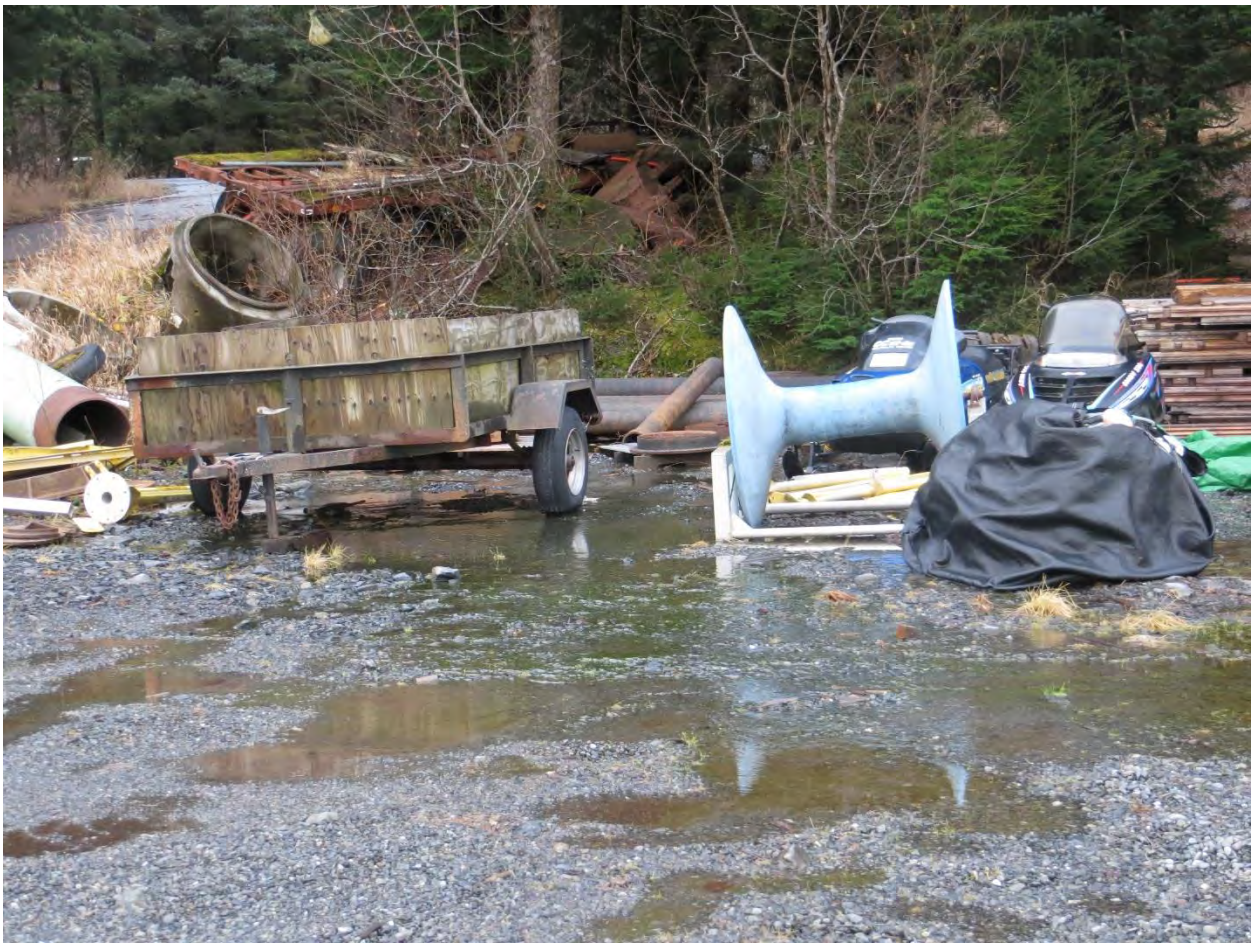


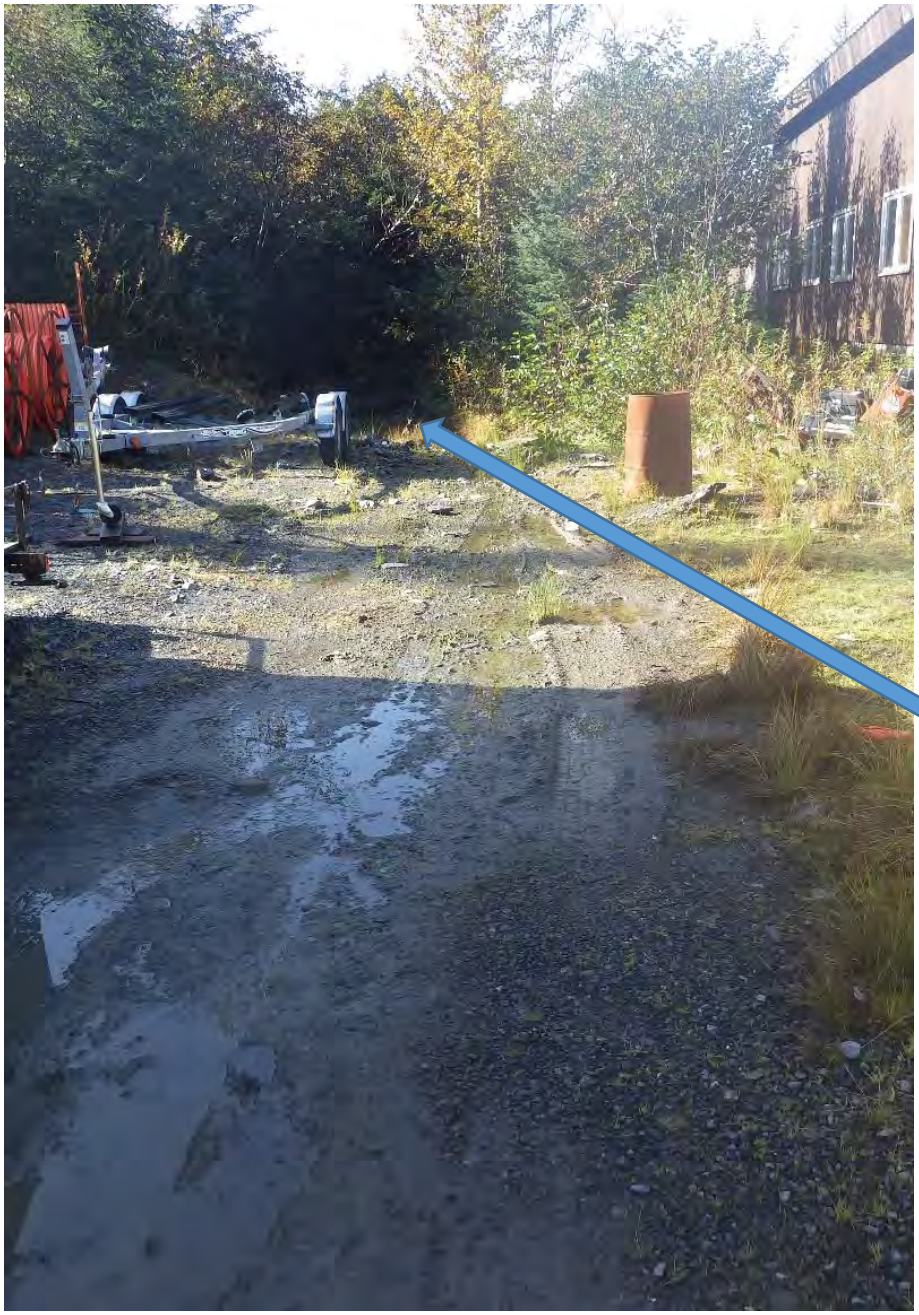


3) Sub-drain and sediment trap
a) Construction timeline and success
i) Photographs documenting construction (at least 10)
*See pictures attachment

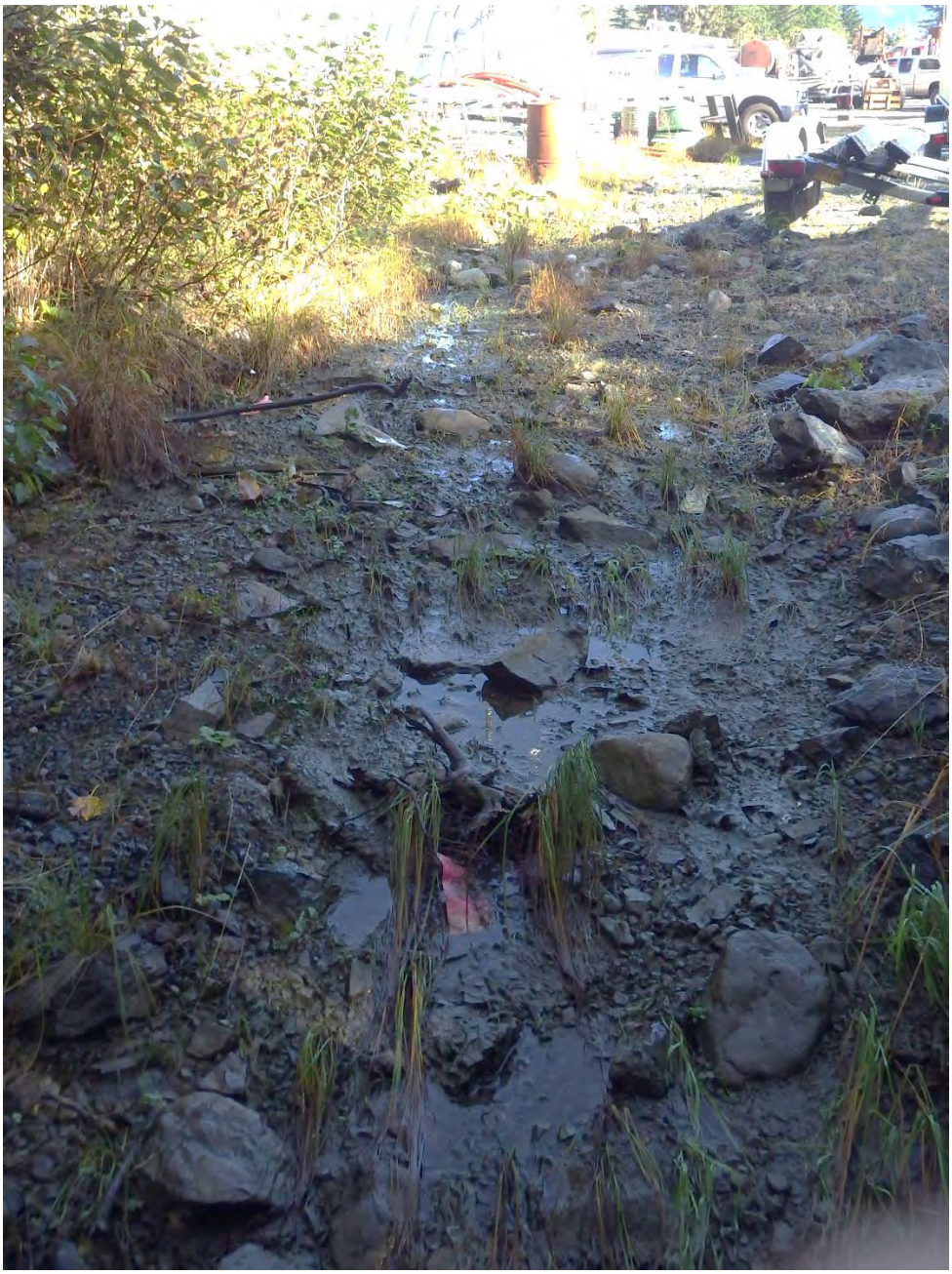
ii) Photographs documenting the finished product
*See pictures attachment

Hanson lot before photos



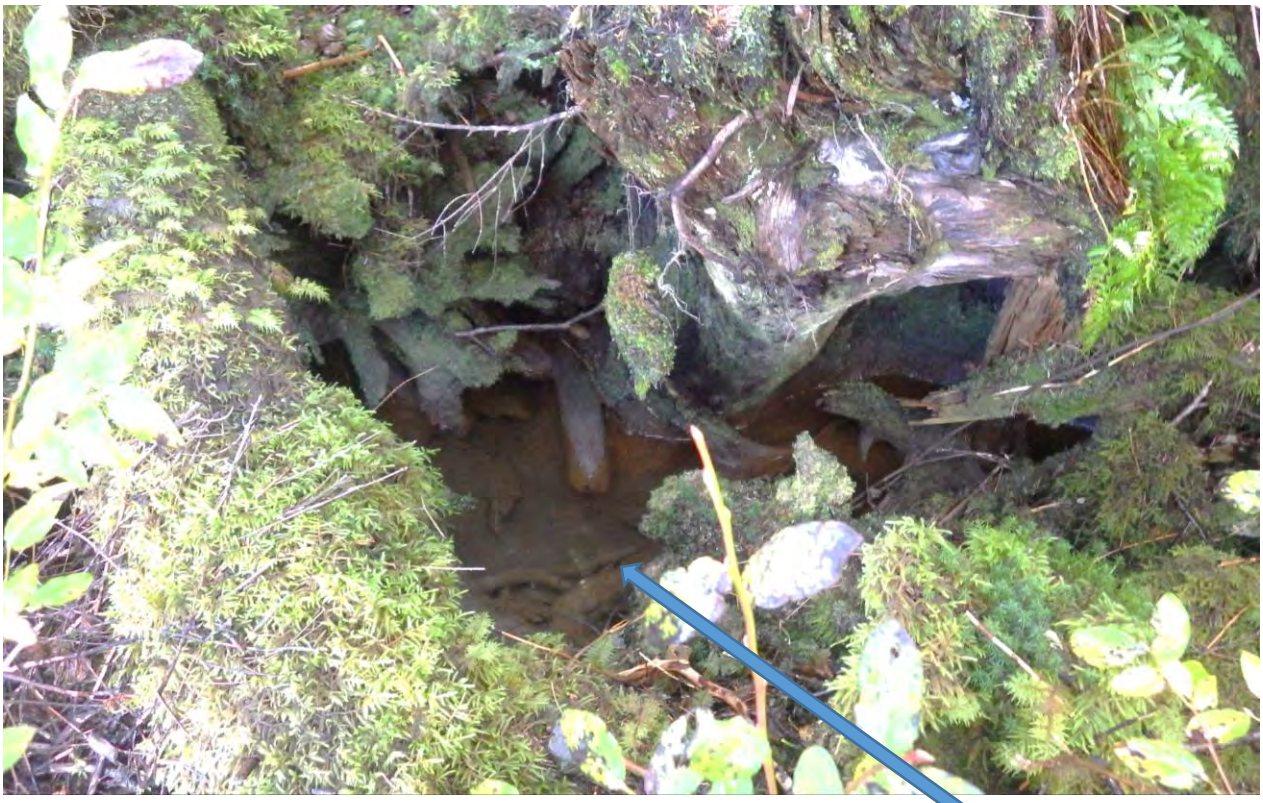


Picture 1: Path of stream located on Ardy Hanson's property. Facing downstream, towards mouth of stream. Photo taken in September during low flow period.

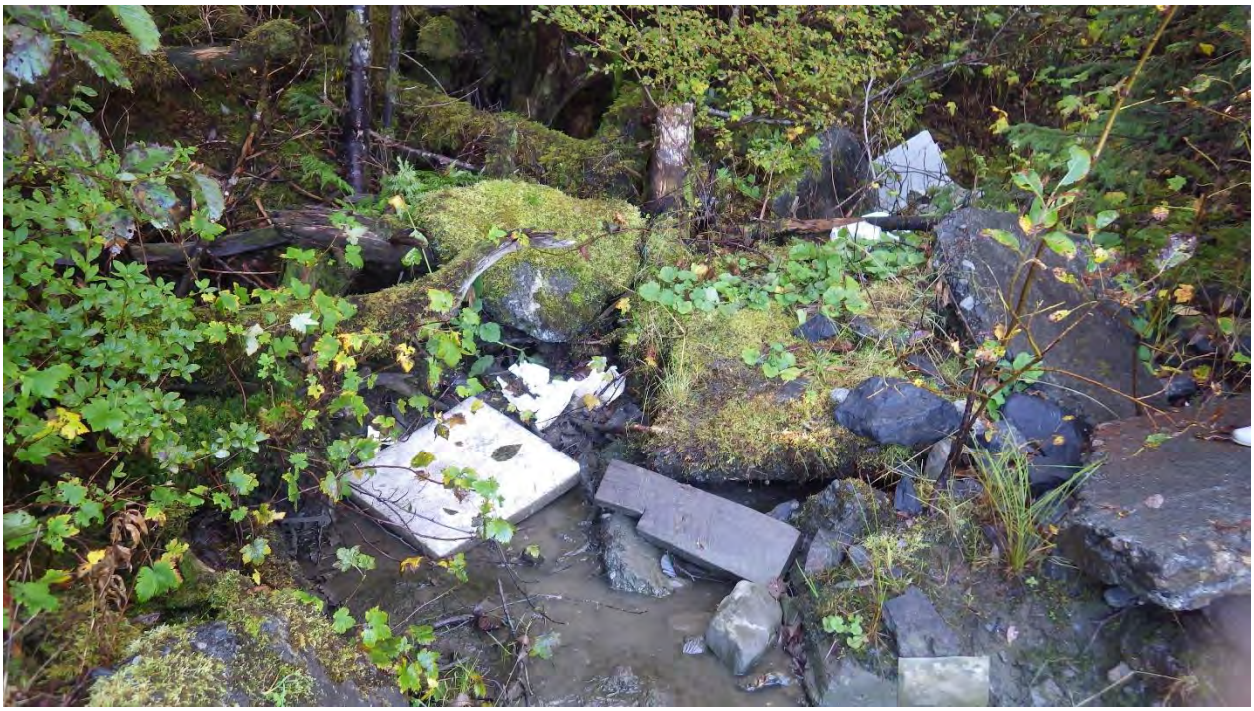


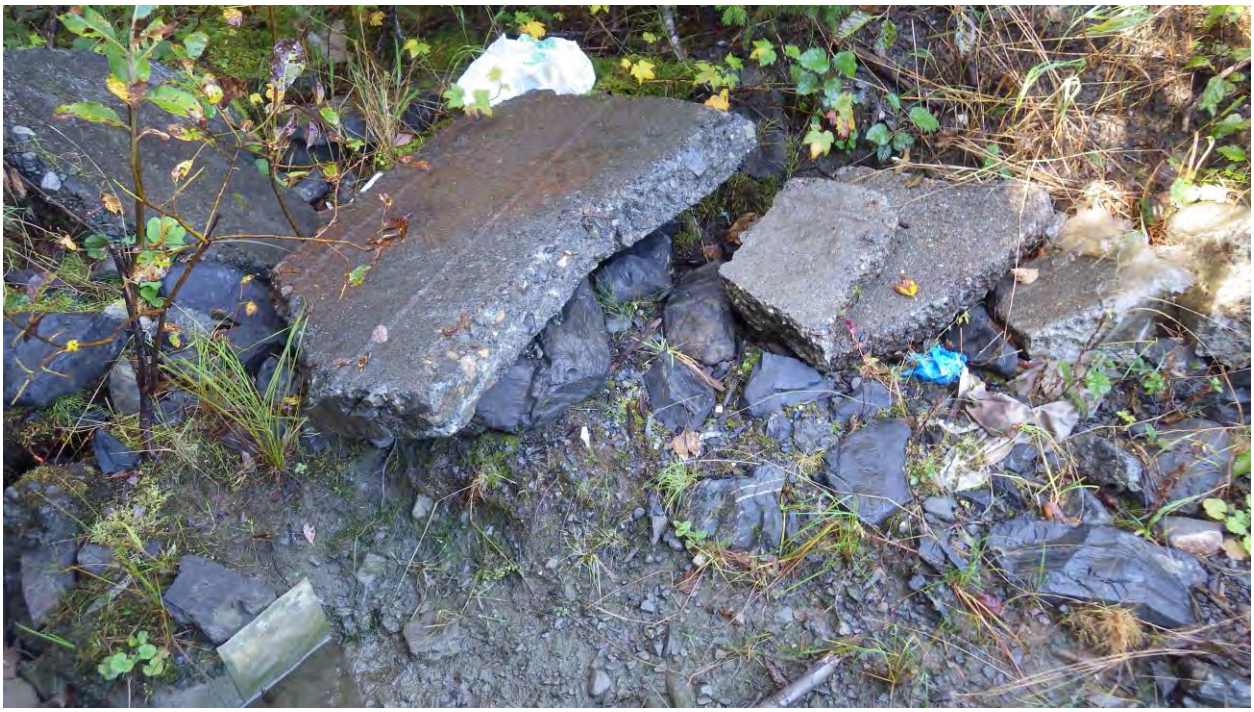
Picture 2: Path of stream located on Ardy Hanson's property. Facing upstream, away from mouth of stream. Photo taken in September during low flow period.

Picture 3: Ardy Hanson's property facing downstream, mouth of stream in view. White Styrofoam and miscellaneous garbage collected at mouth of stream. Photo taken in September during low flow period.

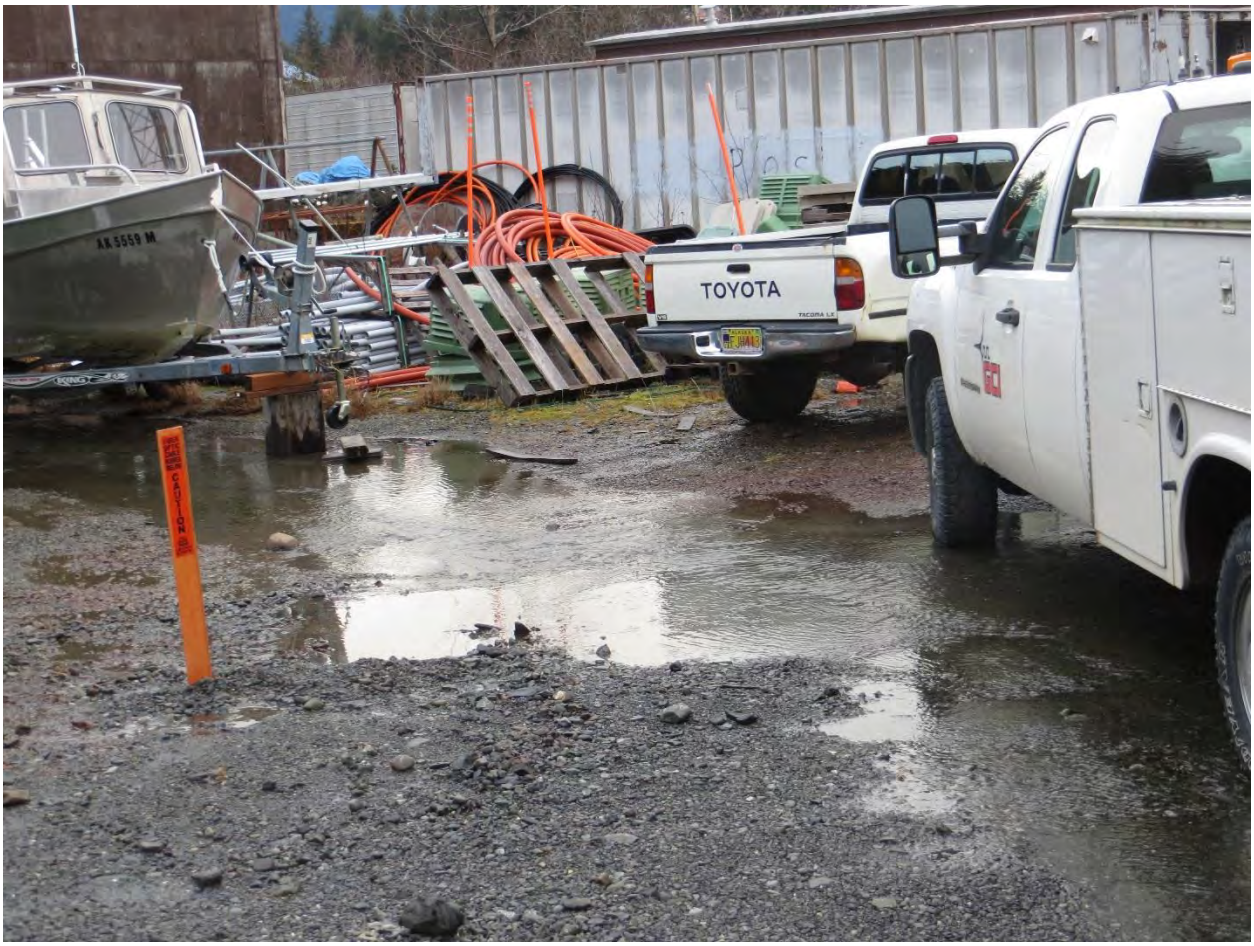


Picture 4: Section of stream, downstream of mouth. Stream is beneath old tree fall and stumps.





Picture 5 and 6: Mouth of stream covered in concrete pieces and garbage.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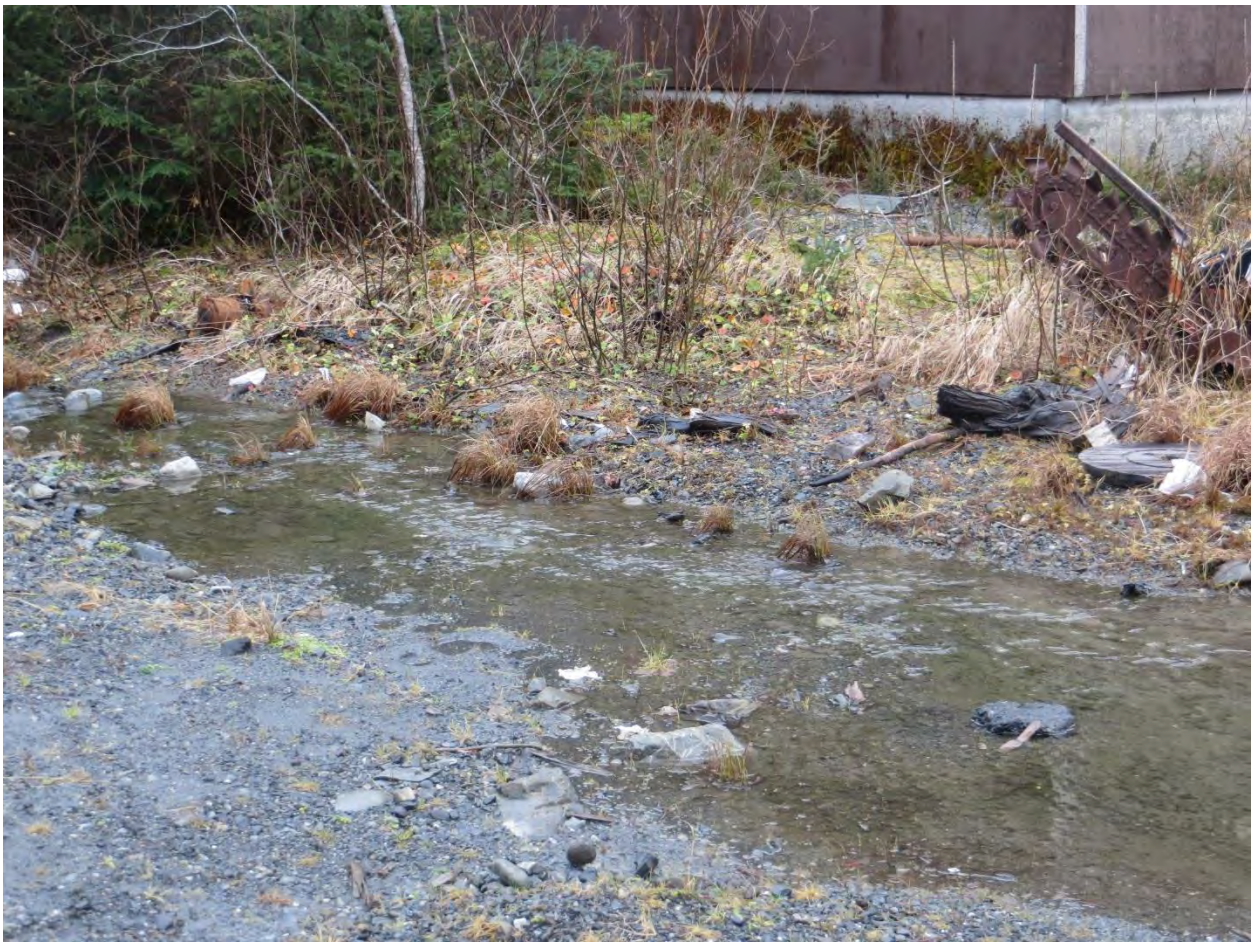
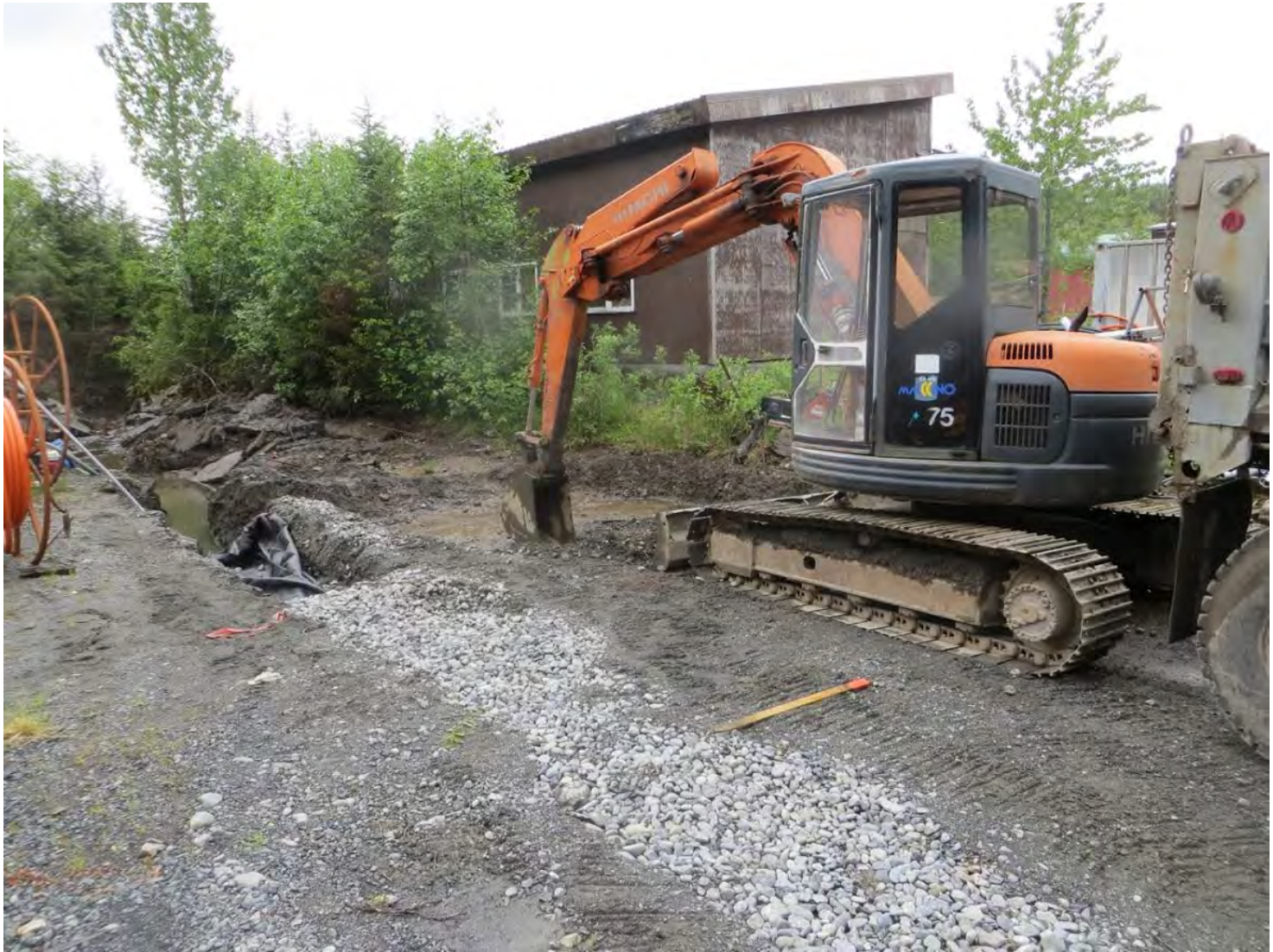
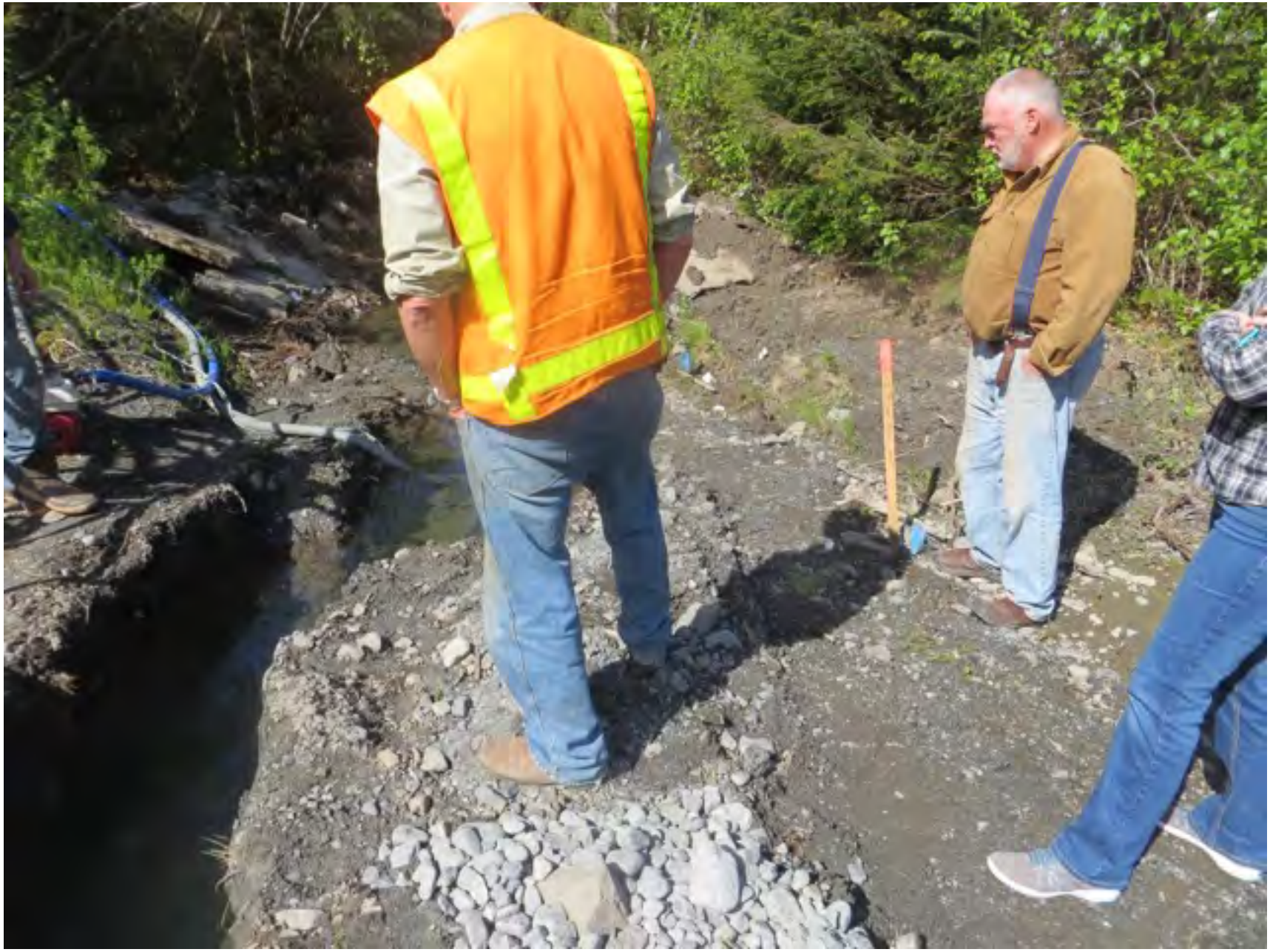
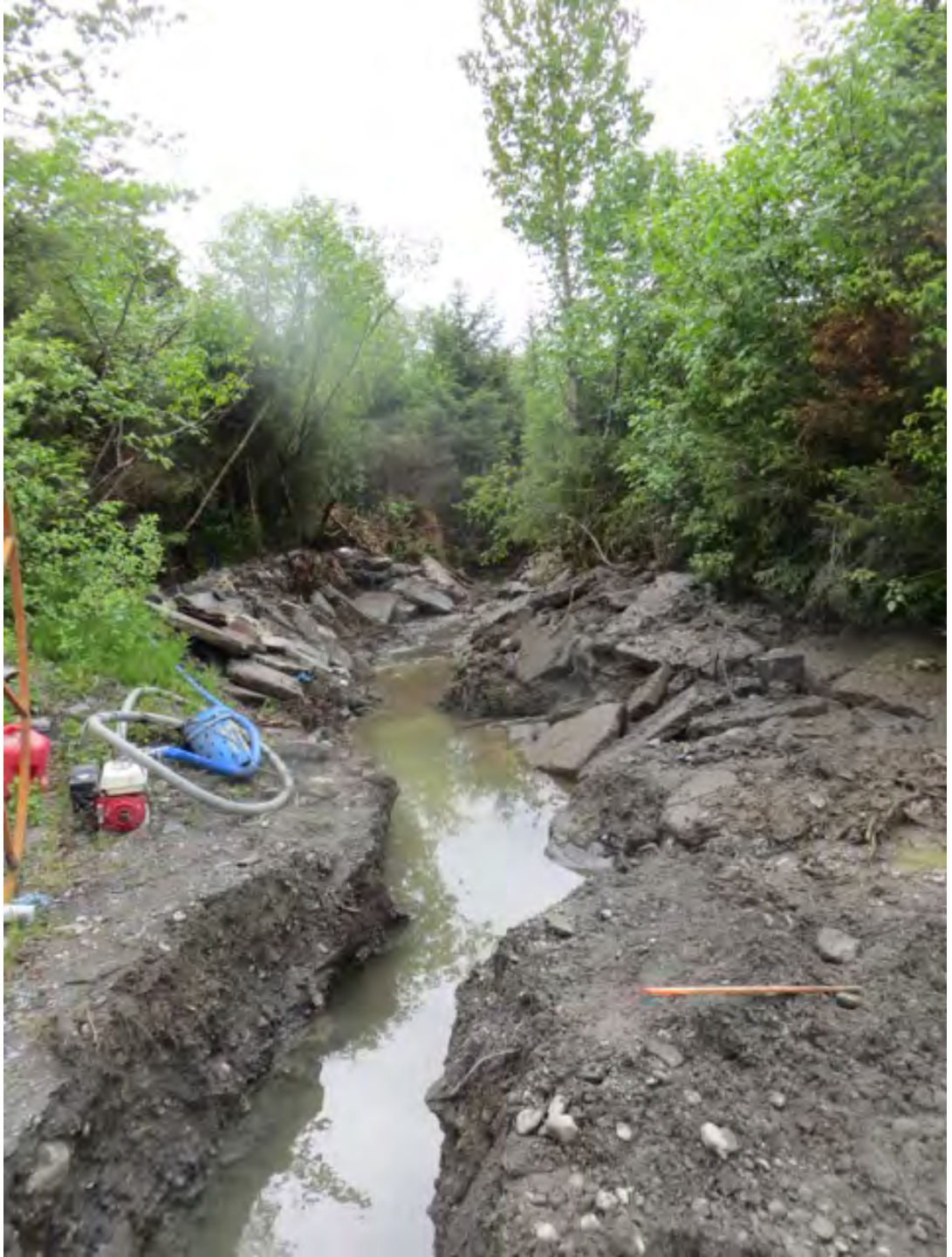
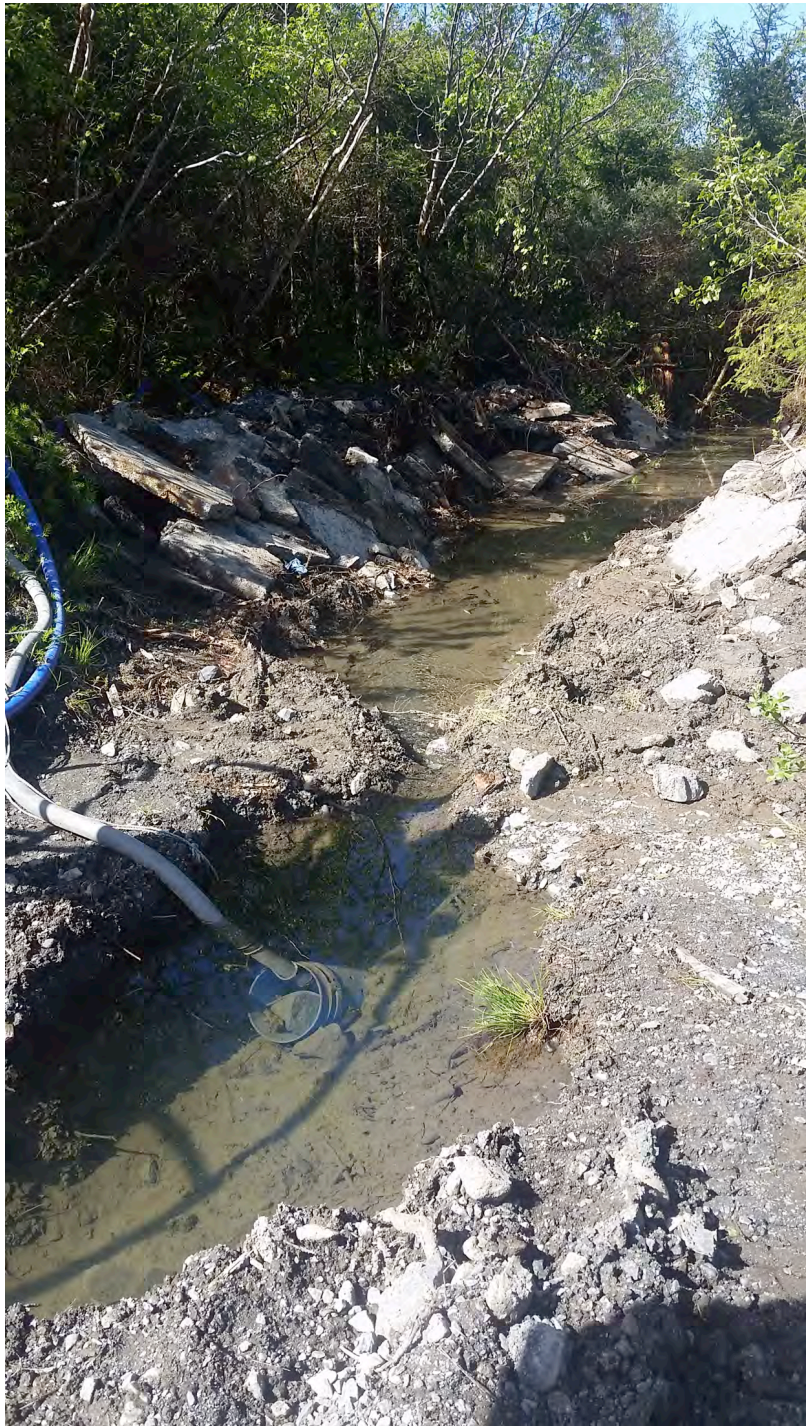


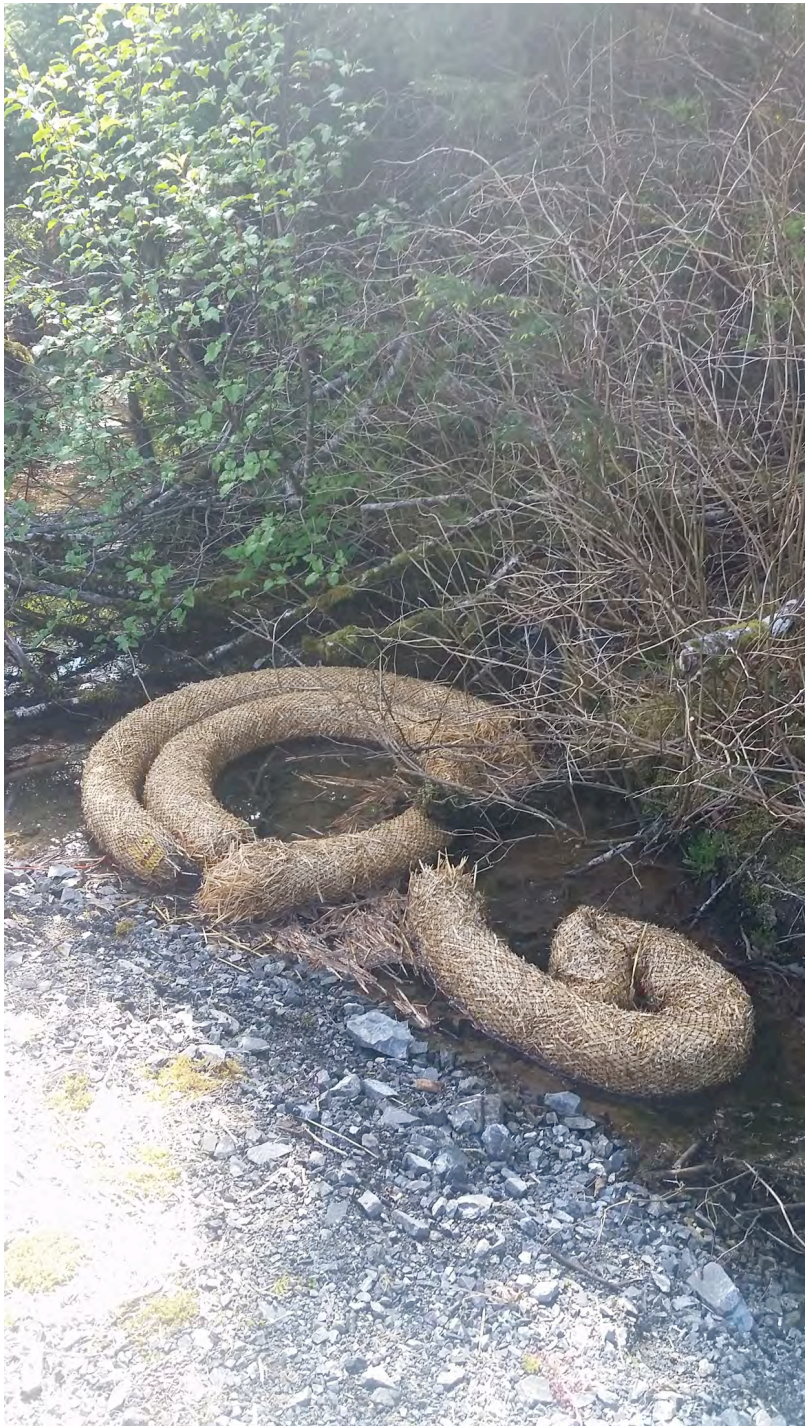
Sub-drain Construction

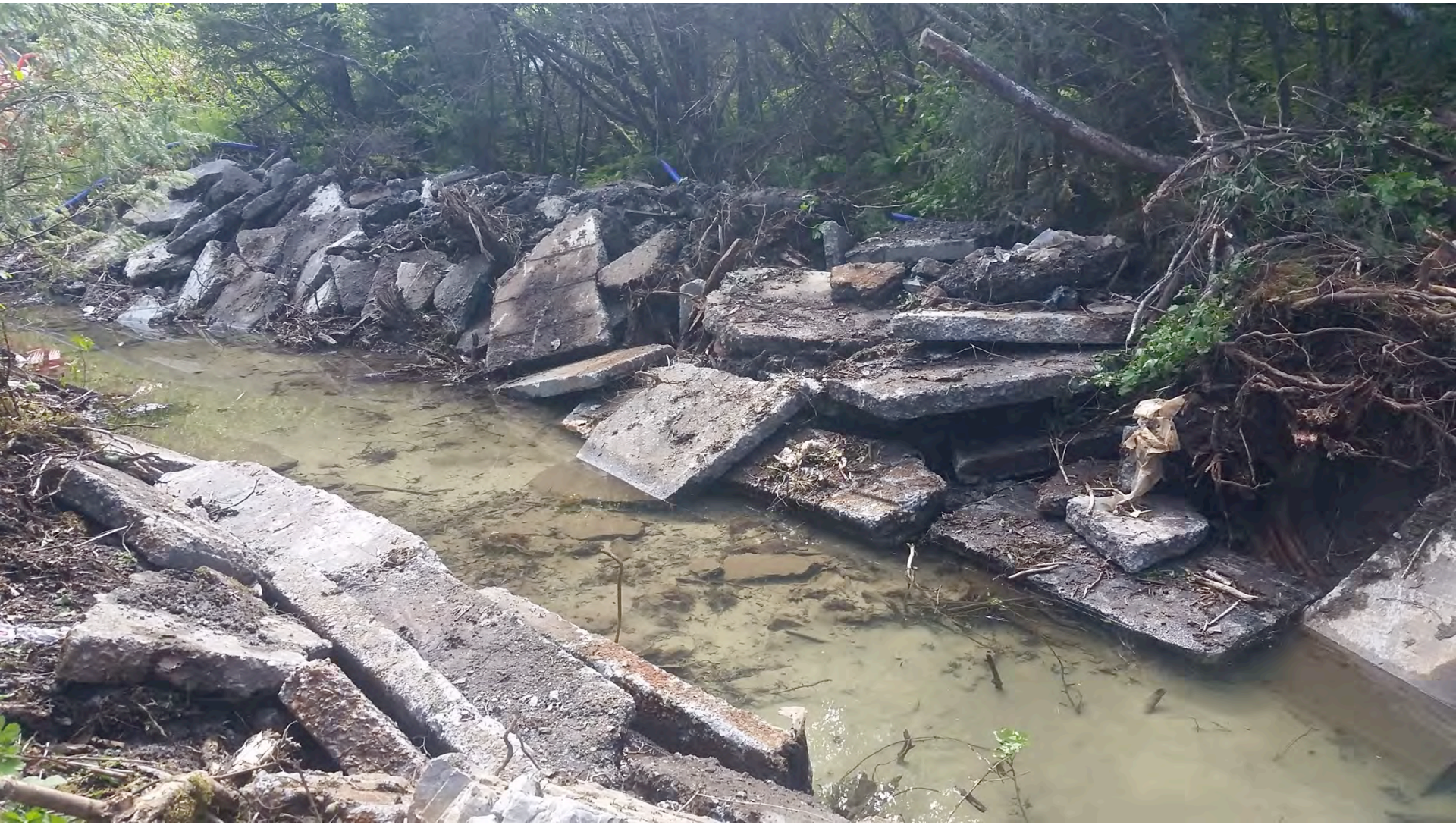




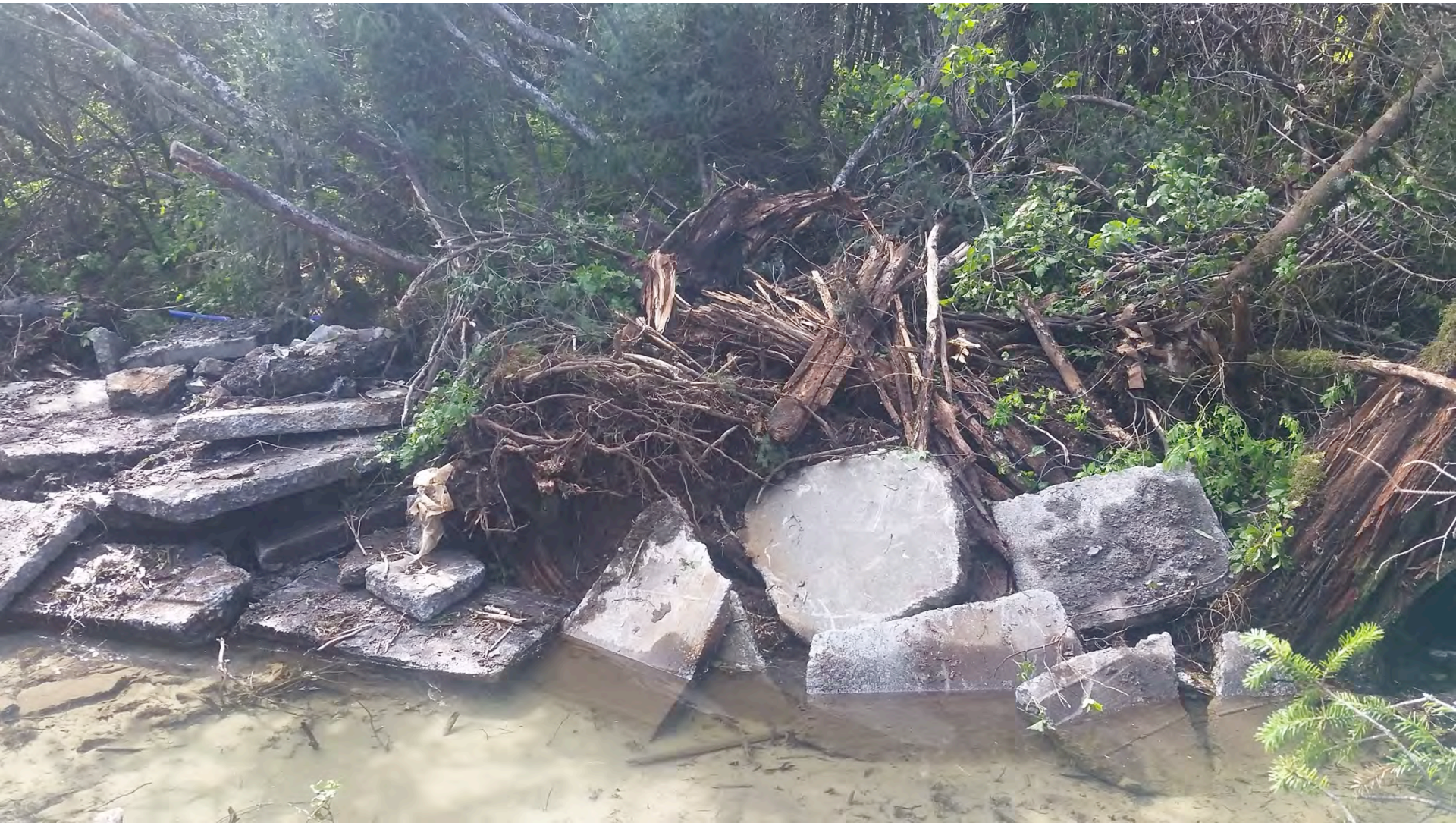




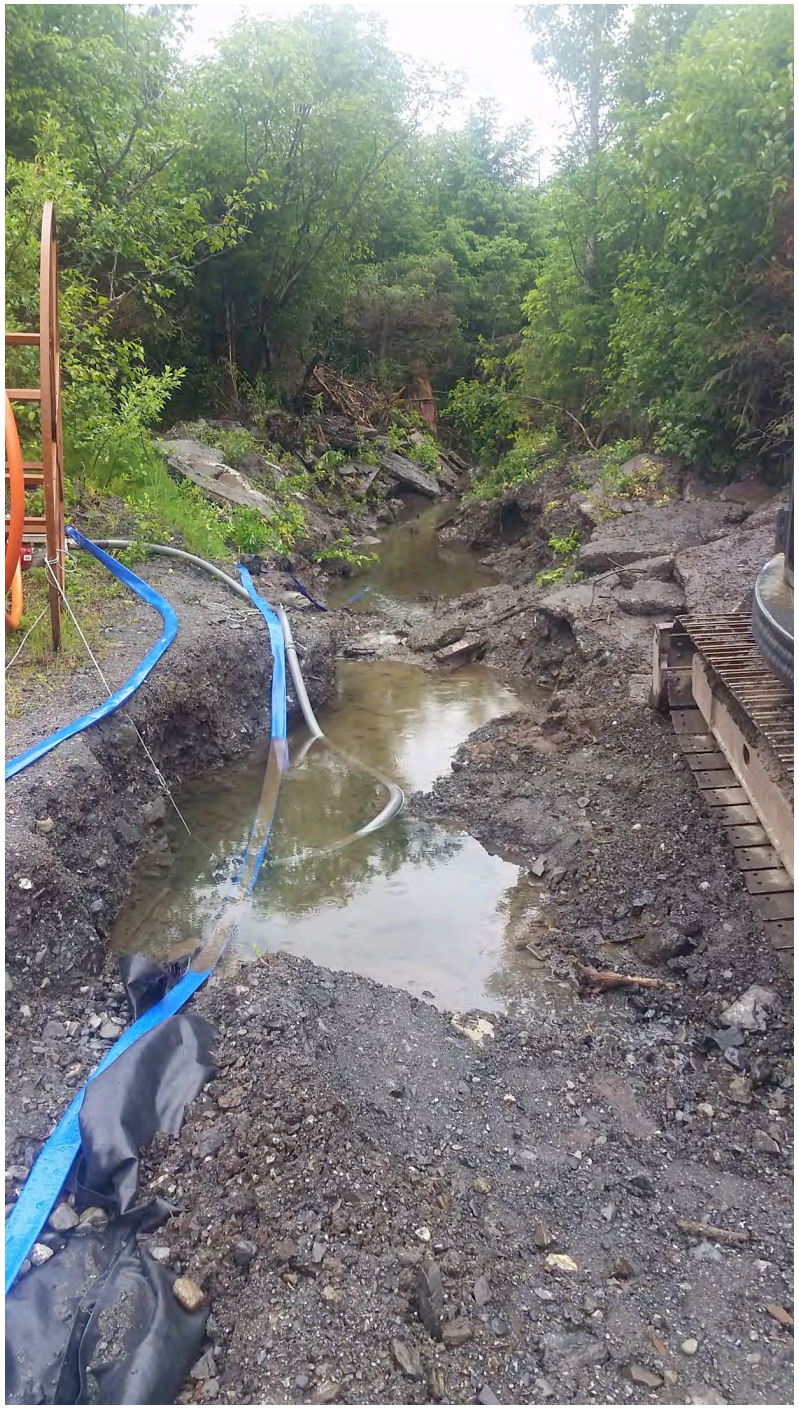


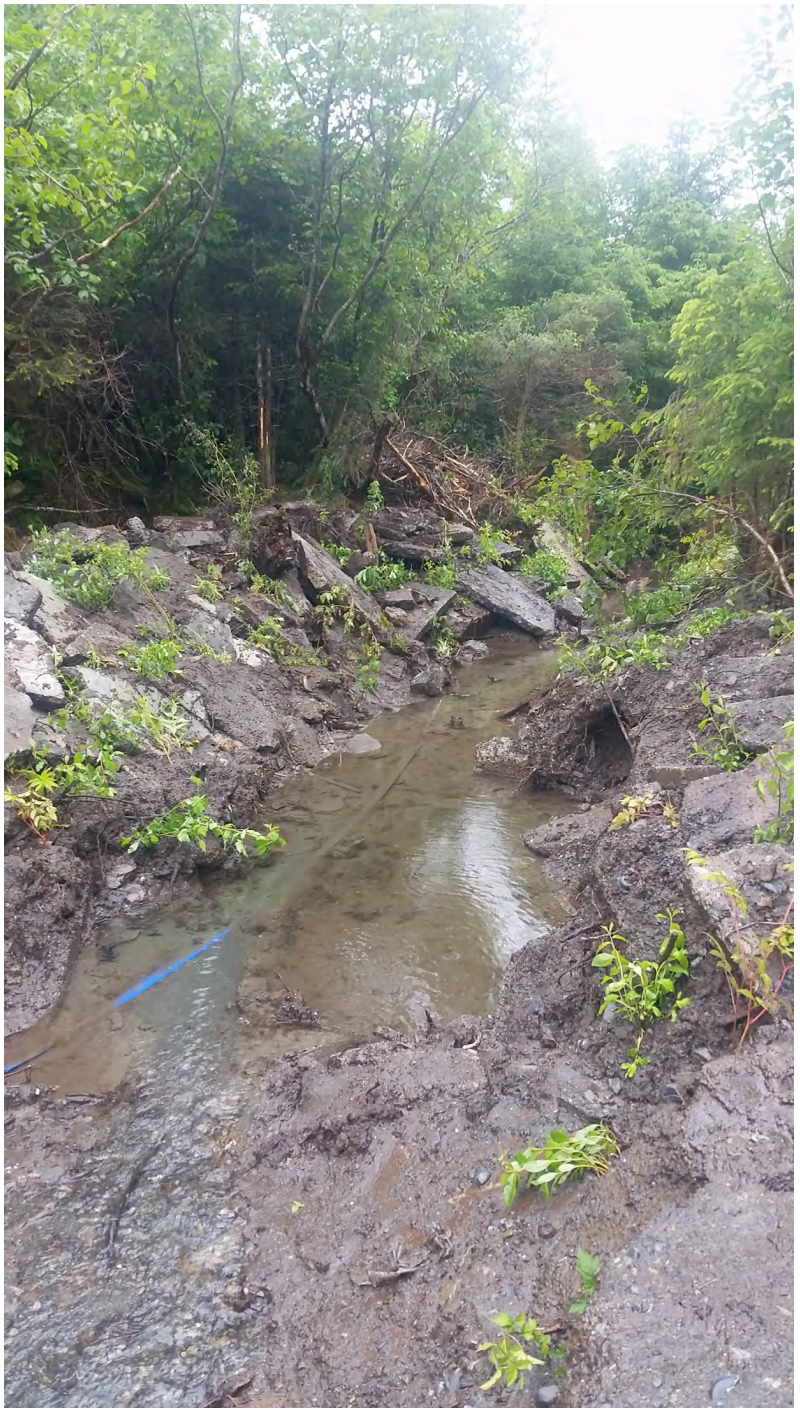


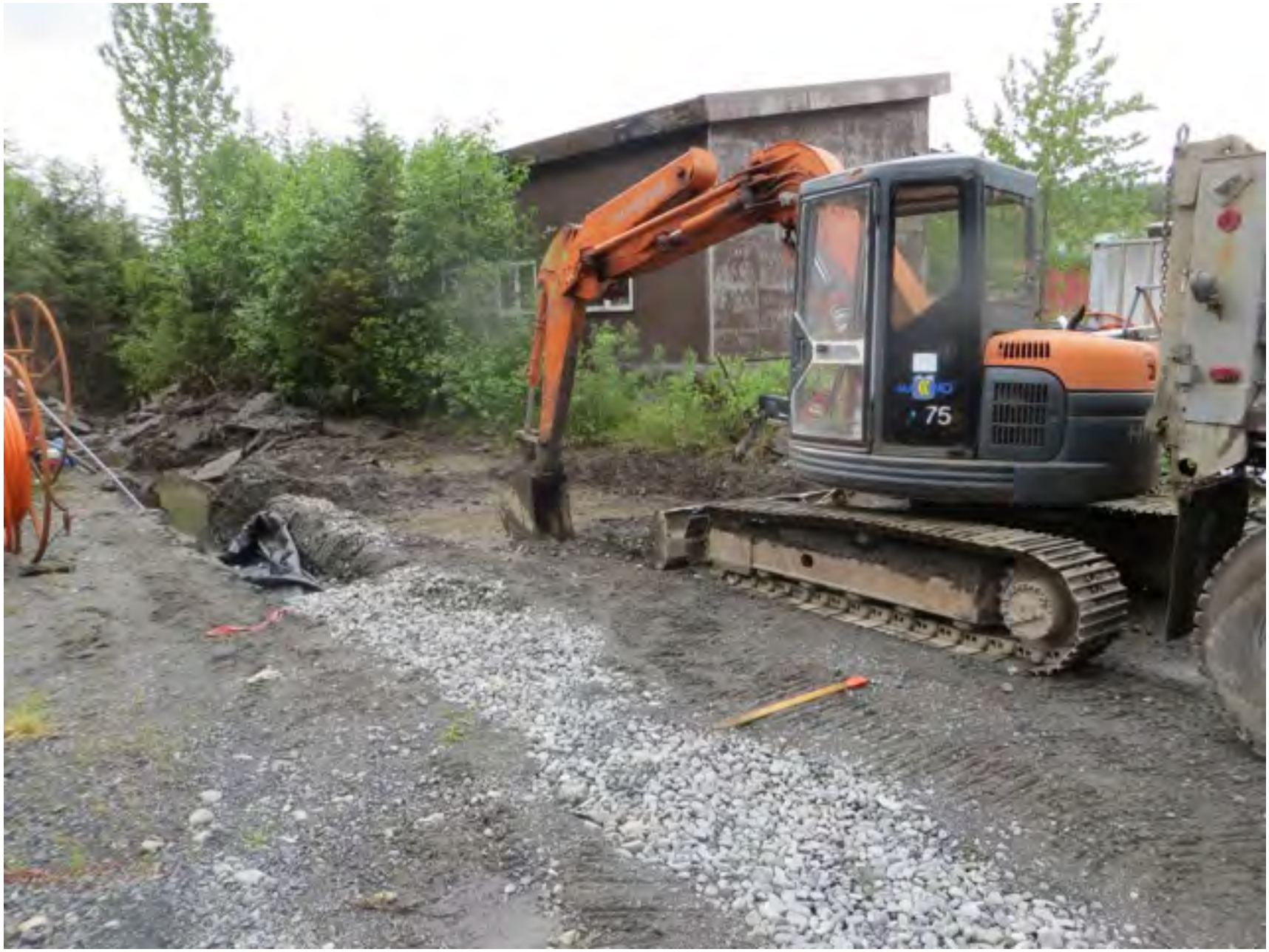
Cement removed from stream



Woody debris removed from stream



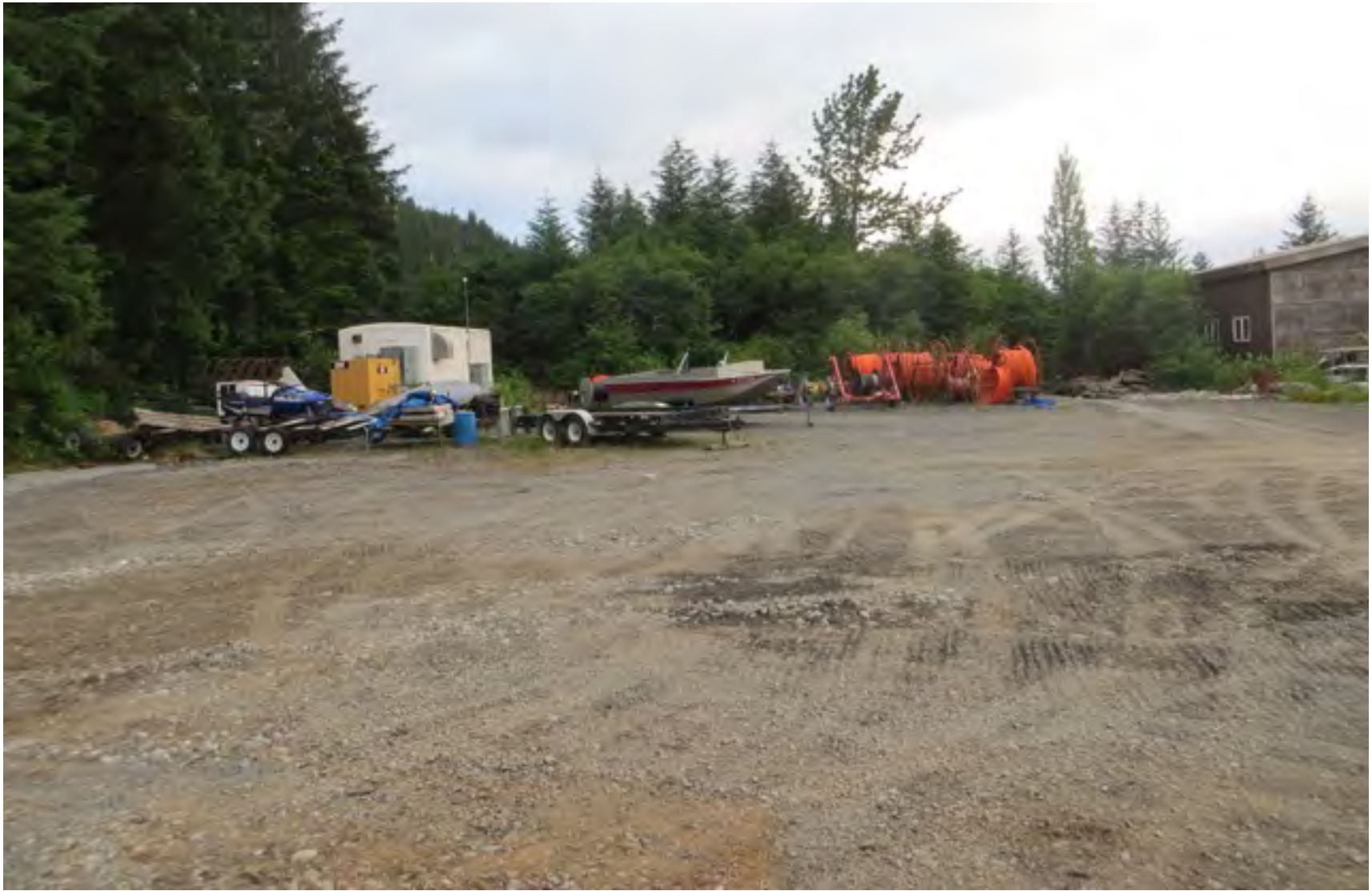


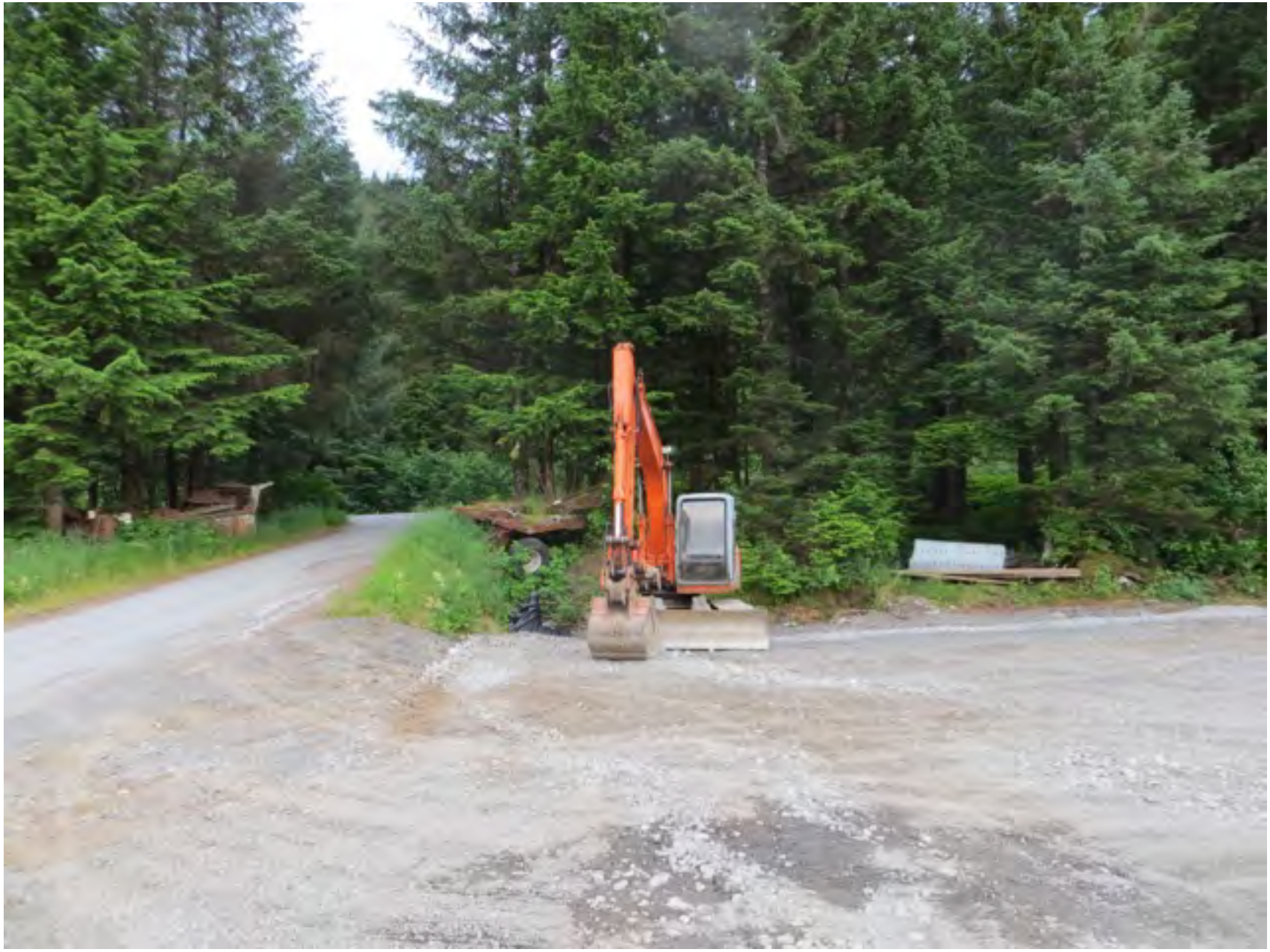


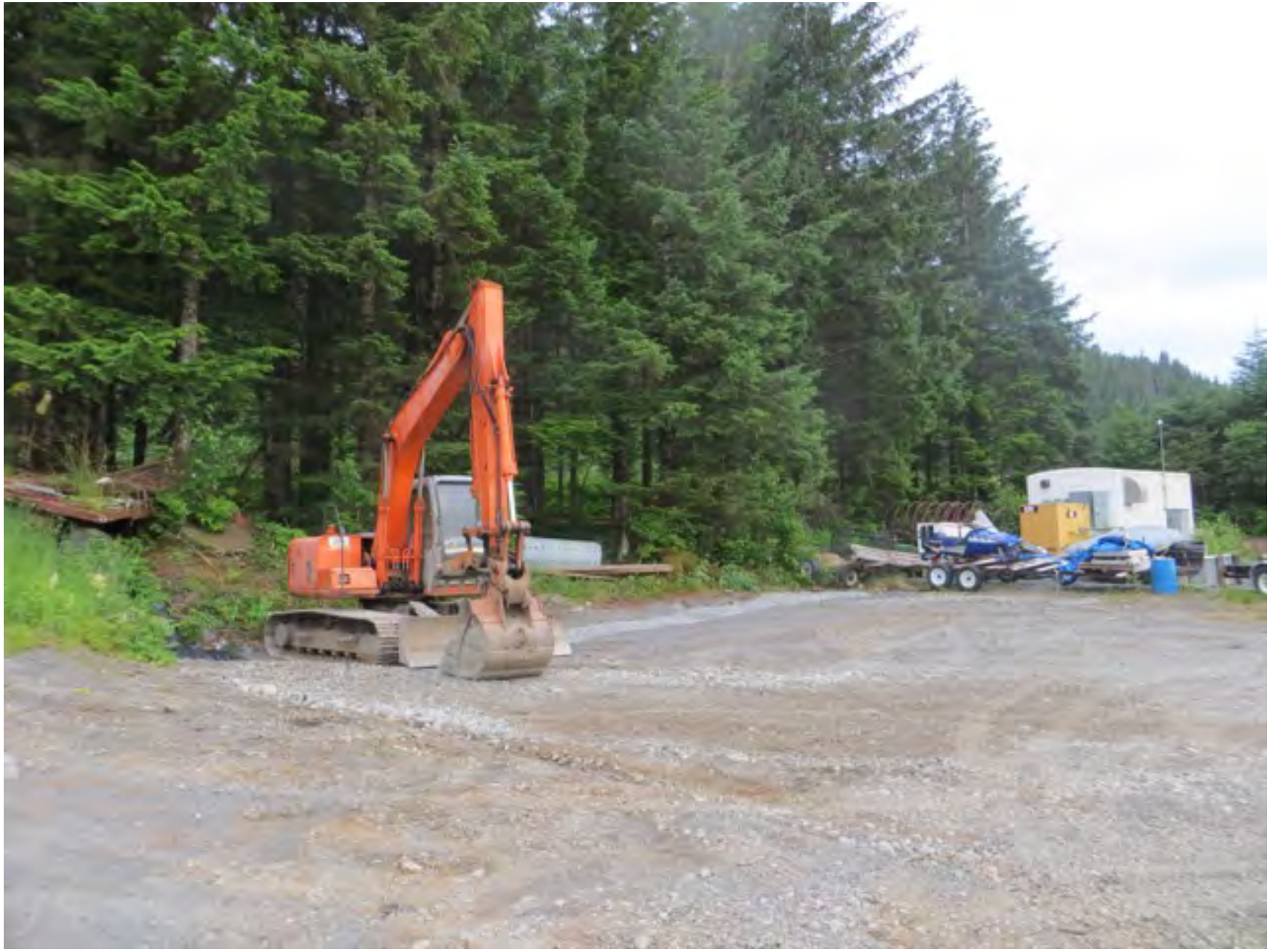
Digging out the sediment basin

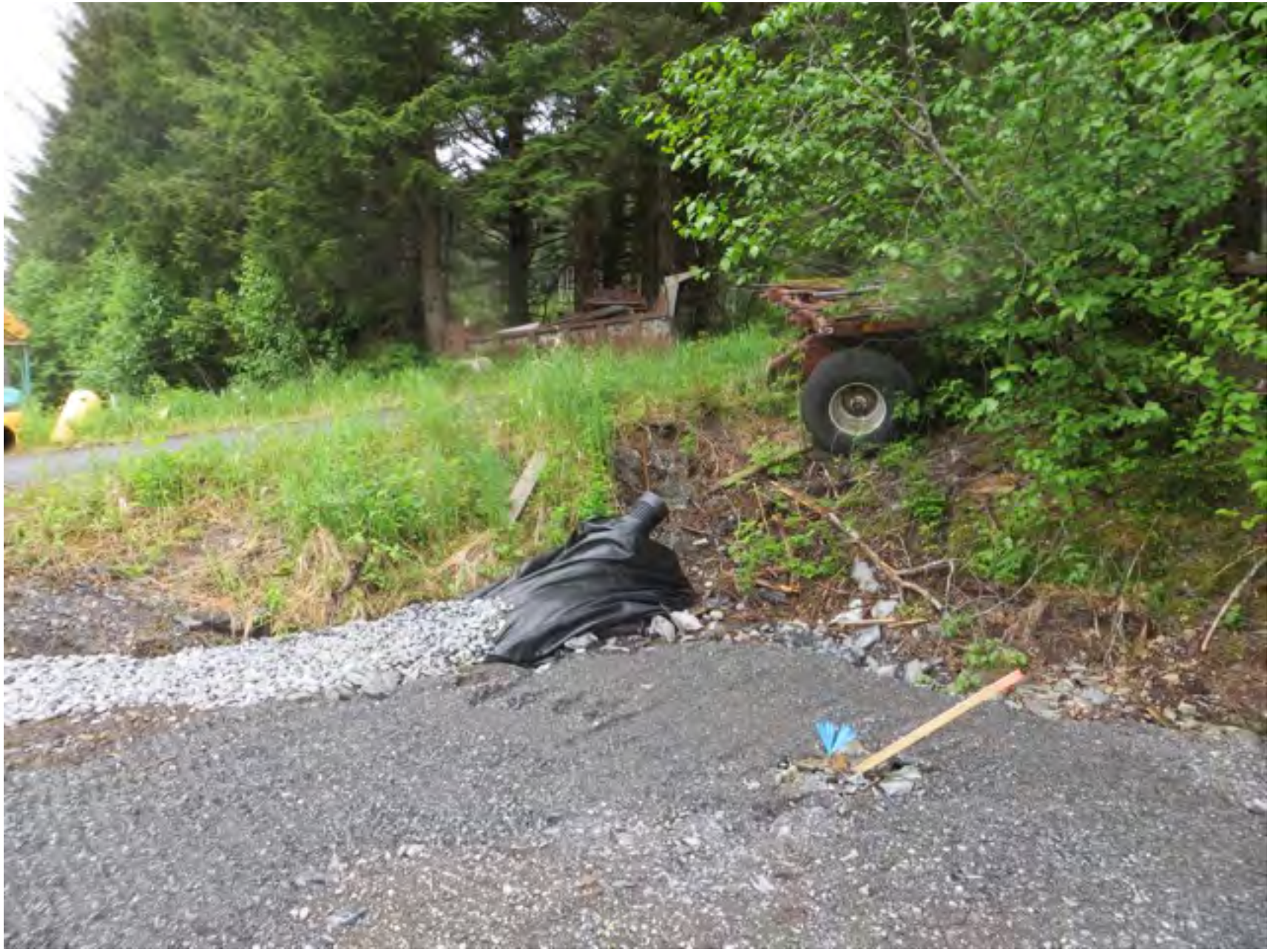
Volunteers with plants to transplant to stream bank

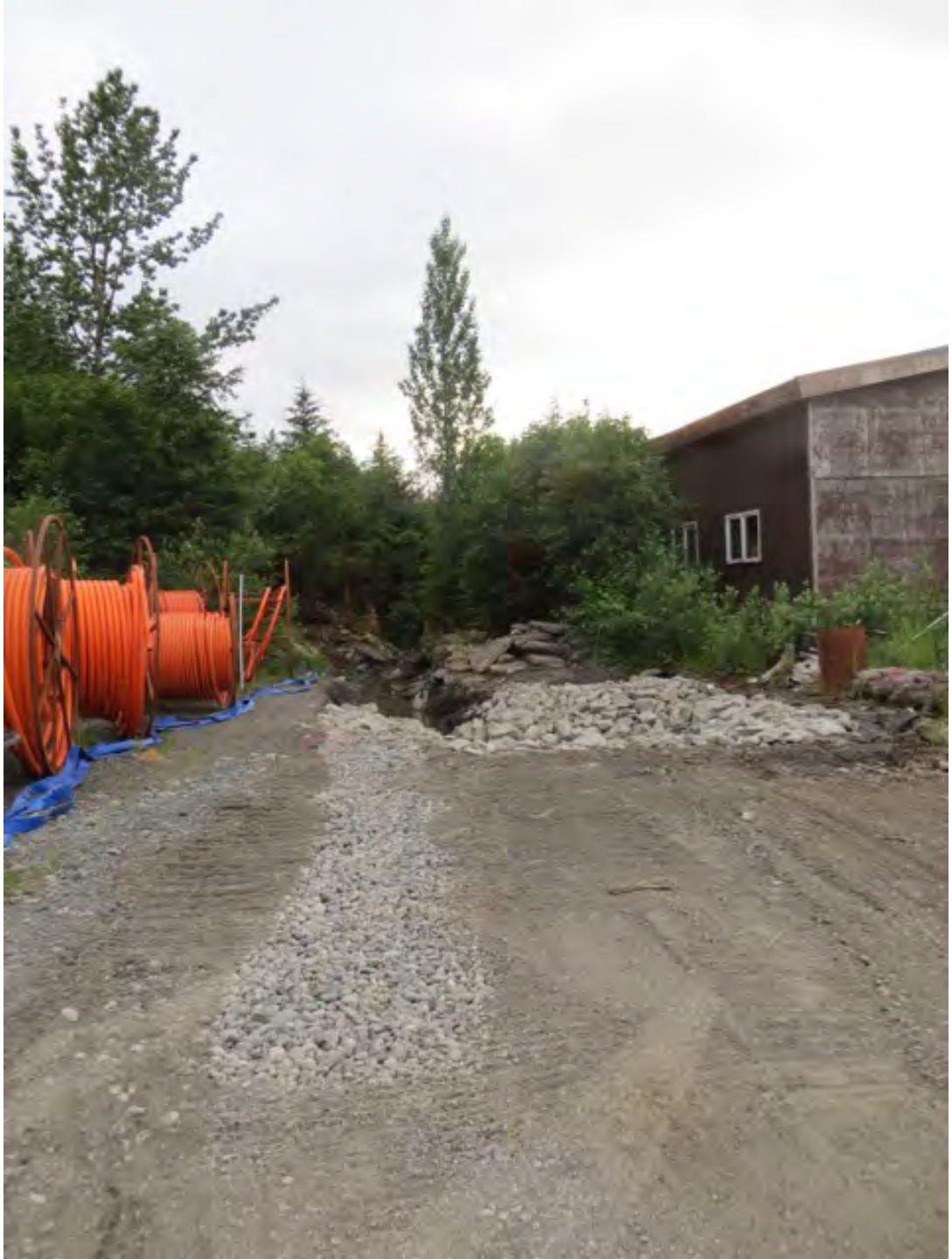
Sub-drain Complete

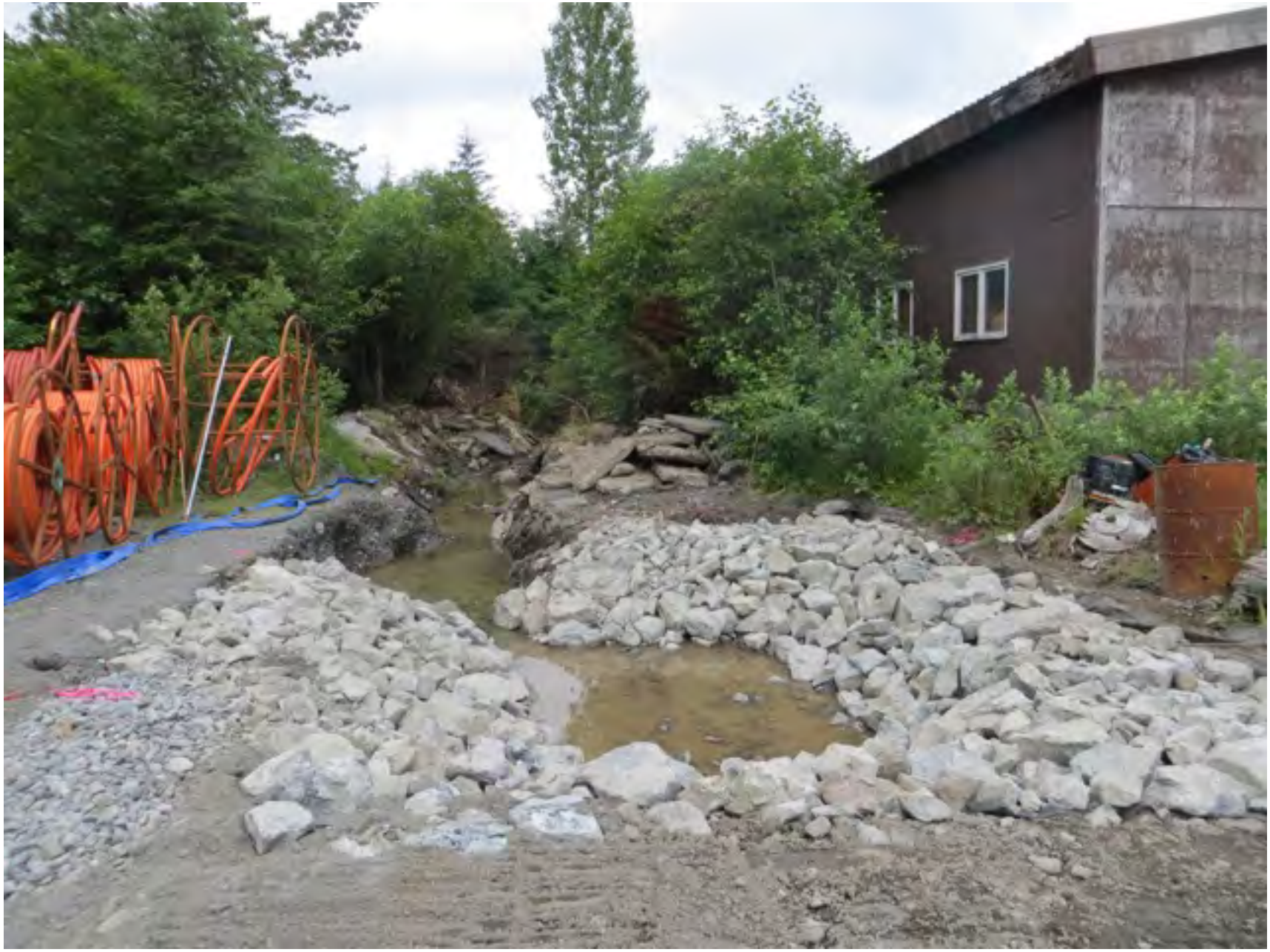




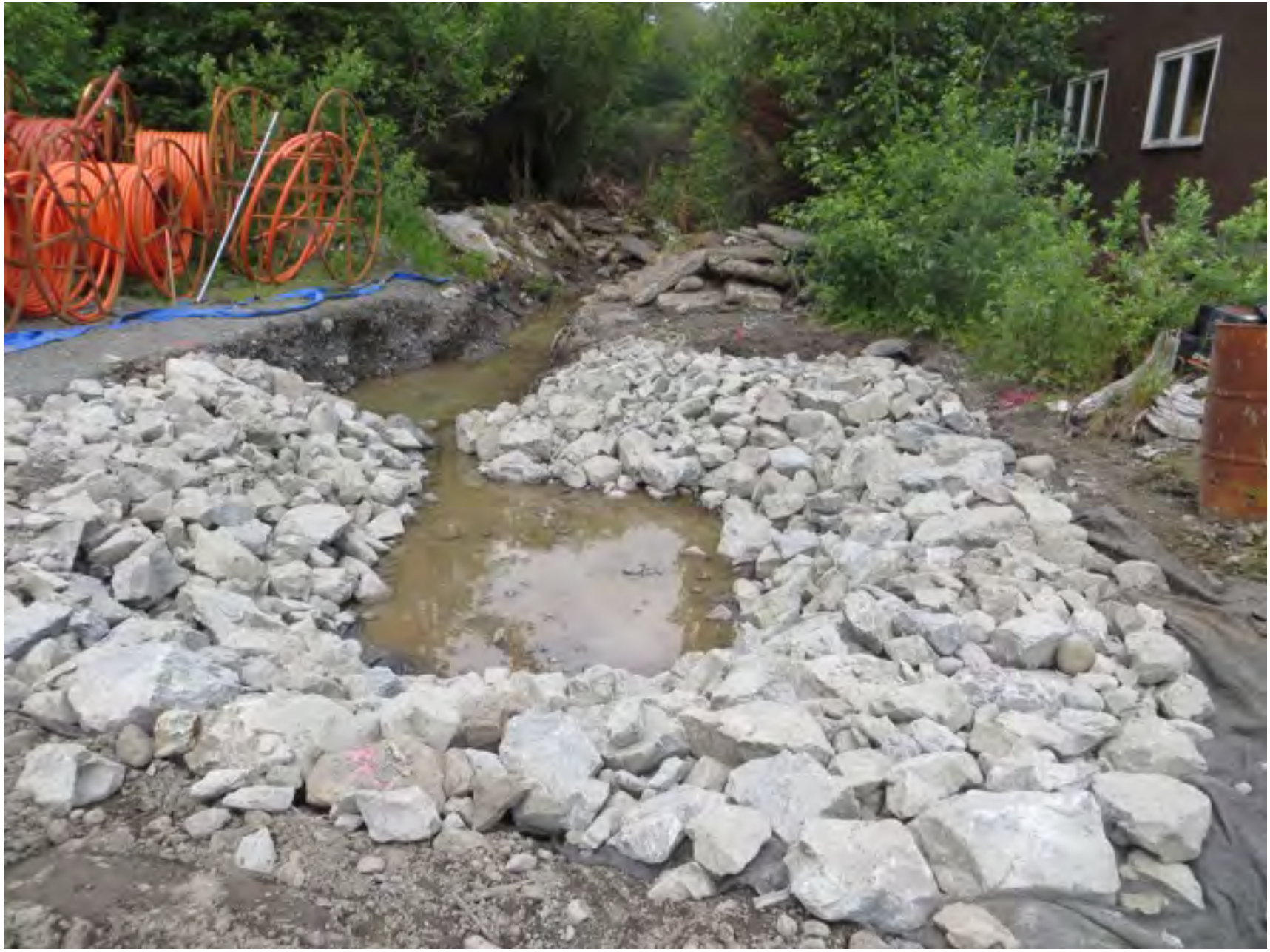


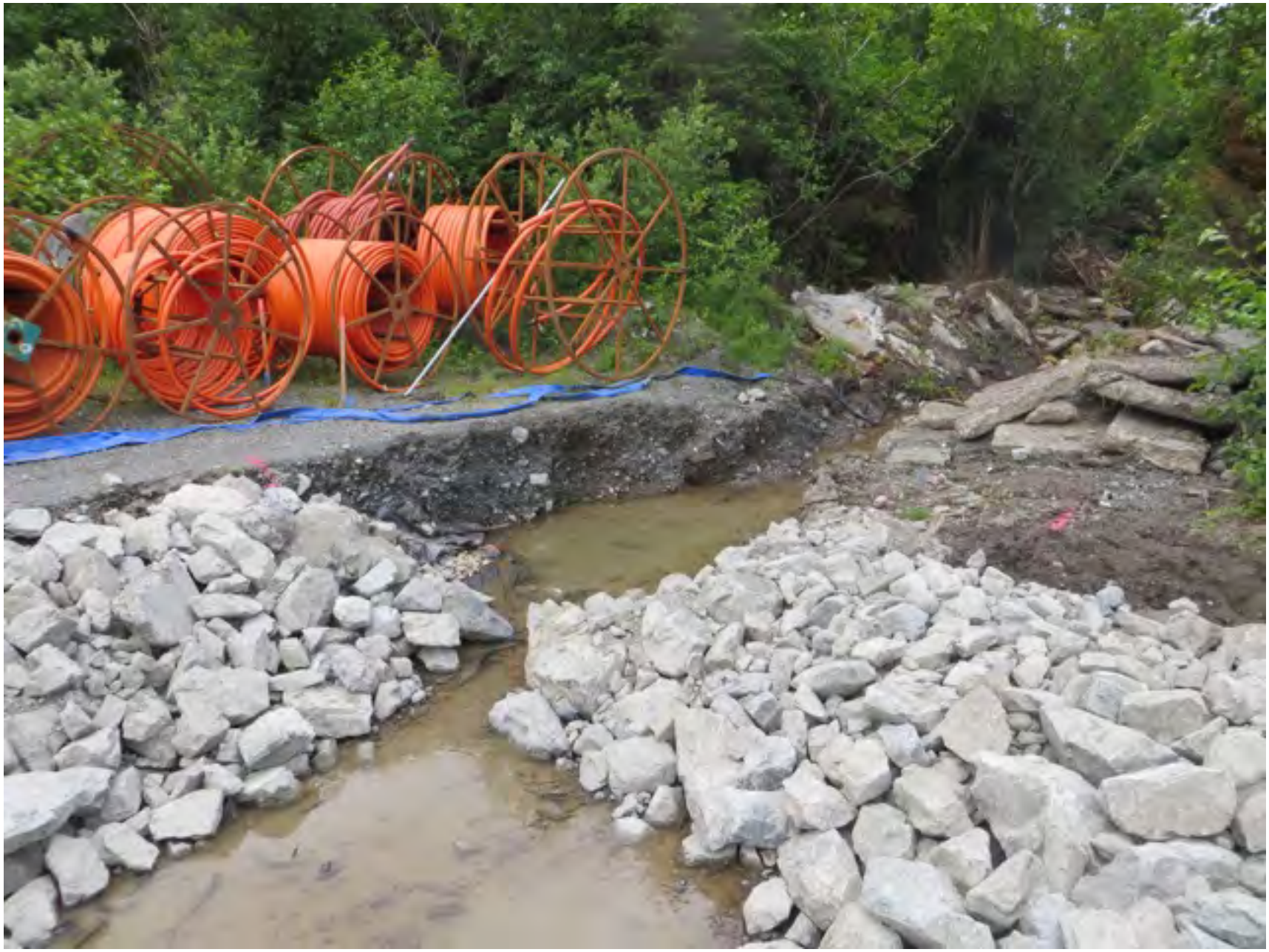


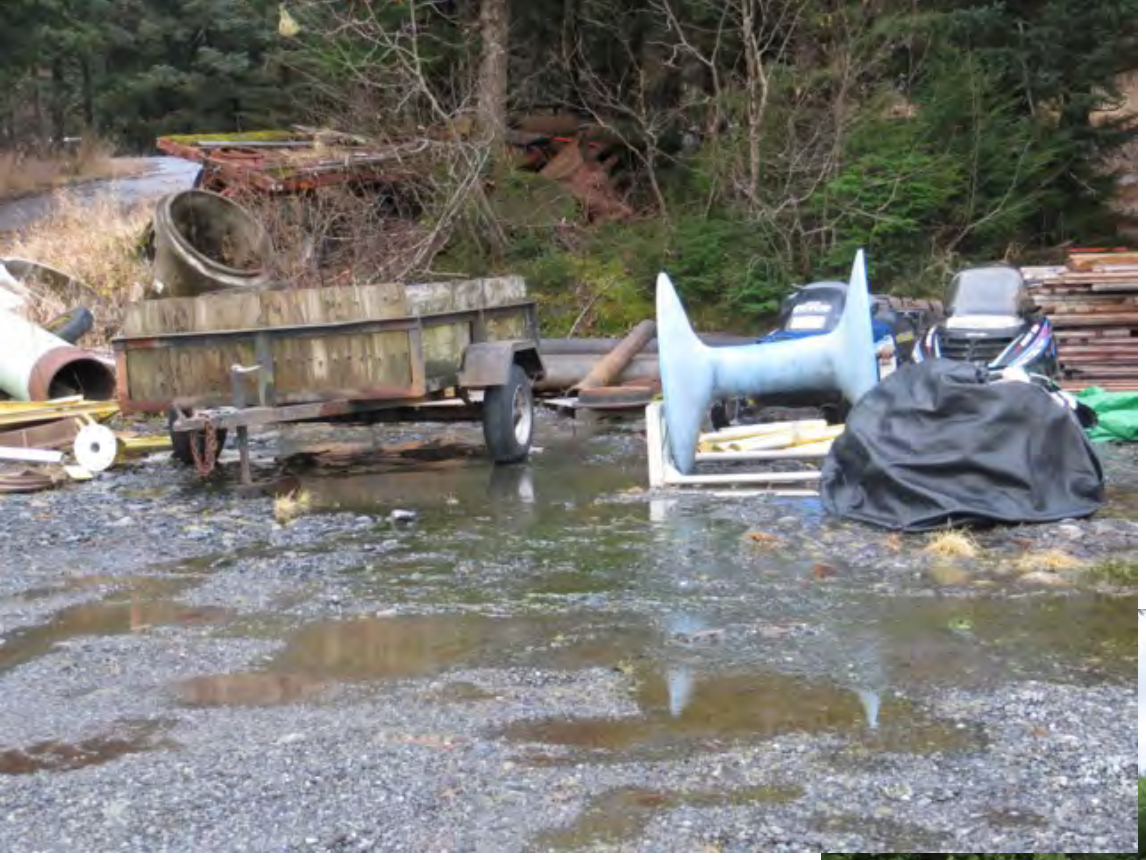




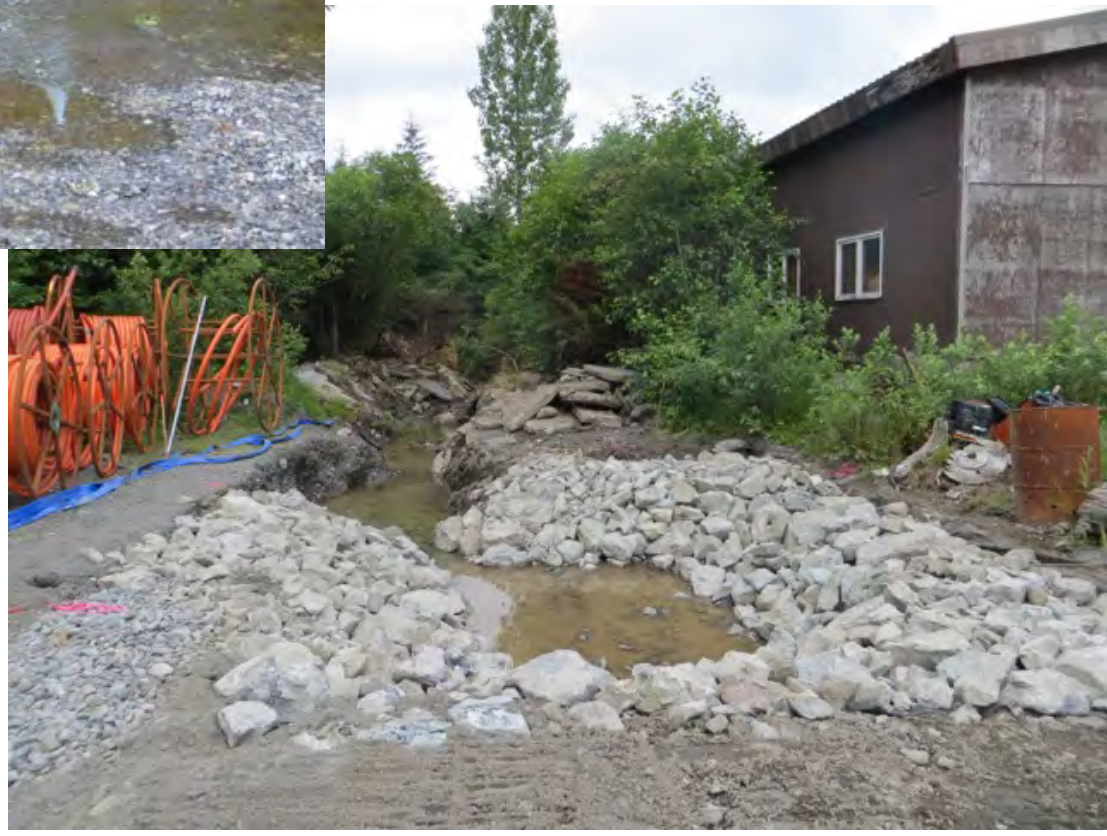
Sediment basin complete







Before



After

b) Description of overall accomplishments and environmental impacts
Prior to this project, Ardy Hanson's lot would pool with stormwater. During a large rain event water would enter Ardy's lot from the Copper River Highway and Center Drive. The pooling allowed water to pick up surface pollutants and carry these pollutants to Odiak pond. Through this grant and our partnership with the Hanson family, the CRWP worked with DOWL engineering and Eagle Contracting to install a subsurface drain. The subsurface drain was placed in the path of highest flow. Clean groundwater will enter the drain and allow for faster drainage of the property.
With less water pooling on the surface, pollutants transported to Odiak pond will decrease. Surface water will travel the natural path towards the stream, but will flow through the sediment basin before flowing to the stream. Sediments and other compounds will settle out in the sediment basin, allowing clean water to enter the stream.

The CRWP partnered with 2 property owners, Eagle Contracting, and volunteers to clean up roughly 200 feet of the stream exiting the Hanson property. This section of the stream was filled with cement and woody debris. The stream cleanup resulted in a more natural stream bottom. Volunteers then planted willows, fireweed, and other native plants in between the pieces of removed concrete. This will provide more stability for the stream bank and a more natural look.
Overall, the sub-drain, sediment basin, and stream clean-up will lead to a healthier stream and Odiak pond. A decrease in pollutants in the stream will provide a better habitat for fish and other aquatic organisms. This not only protects local fish and wildlife, but local economy and lifestyle.
i) Series of photographs over a 24-hour period following a significant rainfall
event
*See pictures attachment – no significant rain event as of July 15, 2017

4) Education and Outreach
a) Pledge to Inspect
i) Number of people reached during outreach efforts and the number of residents that signed the pledge. The Copper River Watershed Project was able to reach roughly 2,000 people through bookmarks, social media, city billing cycles, and local events. A total of 103 residents signed the 'Pledge to Inspect', and 3 winners were drawn for a free car inspection on May 18, 2017.

ii) Description of overall accomplishments and environmental impacts
The Copper River Watershed Project successfully reached a majority of the Cordova winter residents with information on stormwater pollutants and the pledge to inspect. Residents voiced their concerns about pollutants in local stormwater and their appreciation for drawing attention to leaking vehicles. Cordova has a fairly high number of rundown vehicles, many owners were excited to sign the pledge and enter to win a free inspection. Perkins Auto Repair reported an increase in customers asking about leaking vehicle fluidsand steps to fix leaks.

The Copper River Watershed Project was able to reach a younger, non-car-owning crowd, with the use of bookmarks. The bookmarks were used as educational materials at the Cordova High School and the Cordova Library. This outreach method brought teenagers into the conversation about stormwater pollution and the negative impacts it can have on local waterways. Many students pointed out the importance of decreasing stormwater pollution in a town like Cordova, since we are surrounded by pristine wetlands, streams, and ocean.

b) BMP's and spill kits
i) Construction company feedback
Construction companies compared their sill kits to the provided list, and were pleased to see that they provided proper equipment in spill kits. They reviewed the BMP's and felt that they were conscious of these practices and utilized the proper tools. They did feel that it would be good practice to review the provided points with employees.
ii) Utility company feedback
The contacted utility companies appreciated the simple PDF that they could reference. They felt that they followed the rules and guidelines for working near water or with chemicals. Similar to the construction companies, they talked about having a review session with employees to make sure that these practices stay in place.

iii) Description of overall accomplishments and environmental impacts
Providing a spill kit list and BMP's for the construction and utility companies allowed the companies to review their practices and make sure they were up to date. The companies had positive remarks, and were pleased to be practicing advised BMP's for working near water, with chemicals, or storing equipment. The reference sheet will allow the companies to do a quick check for spill kit recommendations or BMP's for certain situations. Overall, providing the companies with the reference sheet reminded them to review policies with employees, and this is the best way to make surecompanies are using BMP's.

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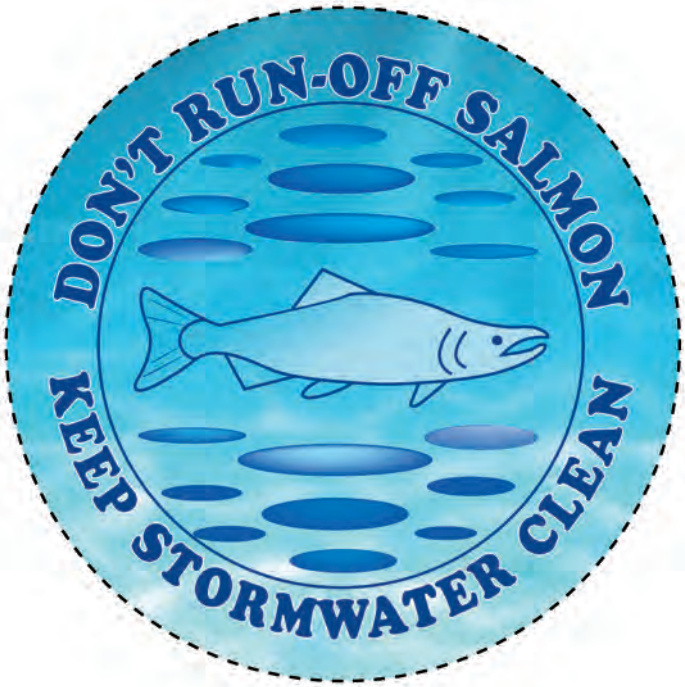
Details	:	Circle Shaped Outdoor Magnets 30 Mil
Quantity	:	250
Proof #	:	1



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Master Automobile Technician
Jason Perkins
avl by appt M-F 8am-5pm
424-5566

September 30, 2016

Kristin Carpenter
Copper River Watershed Project
P.O. Box 1560
Cordova, AK 99574

Dear Kristin,

As we talked about on the phone today, I am writing to confirm our willingness to work with the Copper River Watershed Project to contribute to educating drivers in the Cordova community about the harms caused to our fish waters by leaky vehicles.

Running an automotive repair business, we are very aware of the need for good house-keeping. We mindfully exercise Best Management Practices (BMPs) within our shop to manage hazardous substances.

We are willing to support the CRWP's community efforts on stormwater pollution reduction by donating two full vehicle inspections and one 50% off vehicle inspection to be used as incentives in a public education "pledge to inspect" campaign. Our shop rate is $105/hour, so this contribution will have a value of $262.50. We are also happy to distribute stormwater pollution educational hand-outs at the shop.

We understand that the CRWP will conduct its educational campaign for six months (starting in November, 2016), and a drawing will be held in April, 2017 for the three vehicle inspections from among those who have made a "pledge to inspect."

Sincerely,

Jason & Linée Perkins
Owners