# APPENDIX 6.3.1-F

## Caution Creek Crossing Upgrade

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# Aquatic Habitat Protection Permit Application

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**Prepared for:**

Shore Gold Inc.

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August 25, 2007

**Statement of Submission**

The information included in this report was submitted to:

Chad Wilkinson

Environmental Coordinator

Shore Gold Inc., Fort a la Corne Diamond Project

On August 25, 2007.

The report has been submitted on behalf of Timberline Natural Resource Group. by the following authorized representative who will act as principle contact to the receiving party:

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## 1) Description of proposed work or development:

Upon consultation with the Department of Fisheries and Oceans Canada, Caution Creek is not considered to be a fish bearing stream, thus designs are not required to accommodate upstream fish migration. However, there are small bodied fish present and any instream works may have the potential to affect downstream areas, so good project design and management is important for this crossing site.

The Saskatchewan Watershed Authority has determined the peak mean daily 1:25 flood flow for Caution Creek to be 7.5 $m^3/s$ and the 1:50 flood flow to be 9.3 $m^3/s$. The drainage areas for this area are determined to be 17.0 $km^2$ (effective) and 28.4 $km^2$ (gross). To accommodate such flows and to avoid raising the road, four 4 foot diameter culverts are recommended in series as per outputs from Archon's Drainage Program. The capacity of the drainage will be about 8.5$m^3/s$, meeting a 1:25 year flood interval. A fifth 4 foot diameter culvert will meet the 1:50 year flood interval. However, the stream bed is not wide enough to fit it. The culvert will be installed as per Department of Fisheries and Oceans Canada recommendations:

- The culvert opening will be large enough to allow passage of debris;
- the culvert length will be minimized by installation perpendicular to the road;
- the culvert gradient will be maintained as close to the natural stream grade as possible;
- to ensure stream connectivity during low flow periods the bottom of the new culvert shall be installed at least 20% of the culvert diameter below the thalweg (deepest part of the channel) of the watercourse;
- the culvert will be positioned to fit the straight part of the stream channel to avoid discharge onto a potentially unstable riverbank;
- rock rip rap shall be keyed into the substrate at the road slope/water interface to resist movement and be used in conjunction with a geotextile fabric to prevent undermining or erosion. The rip rap "apron" shall extend above the normal high water level and be of a size to resist predicted velocities of stream flow;
- the culvert will be installed on a firm bed of compacted granular material.

Figures 1 through 4 are design diagrams from the standard engineering drawings of the U.S. Department of the Interior: Bureau of Land Management (available at: http://www.blm.gov/wo/st/en.html). Four culverts will be installed adjacently, in series, using these diagrams.

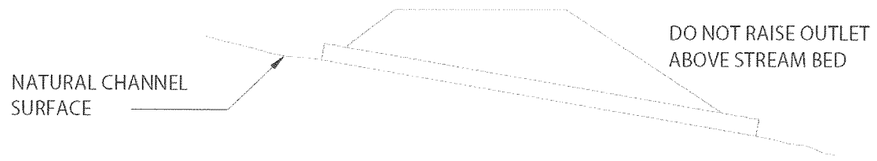



Figure 1. Culvert placement.

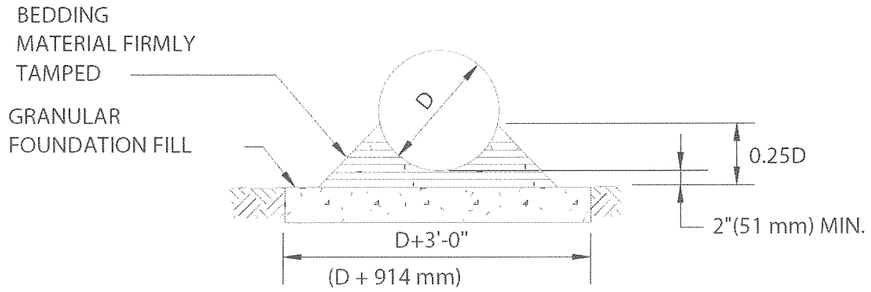



Figure 2. Cross section of culvert bedding.

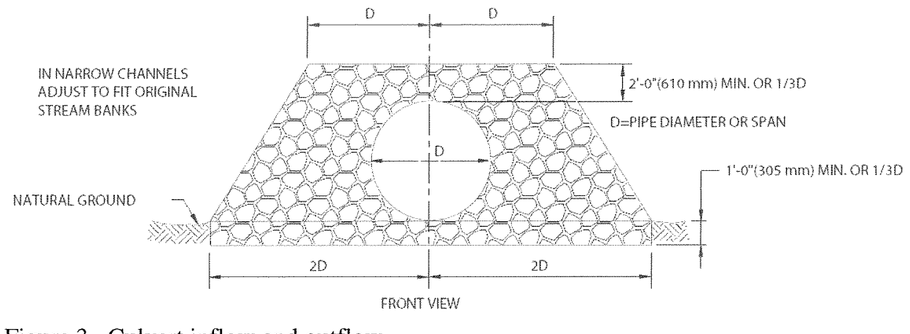



Figure 3. Culvert inflow and outflow.

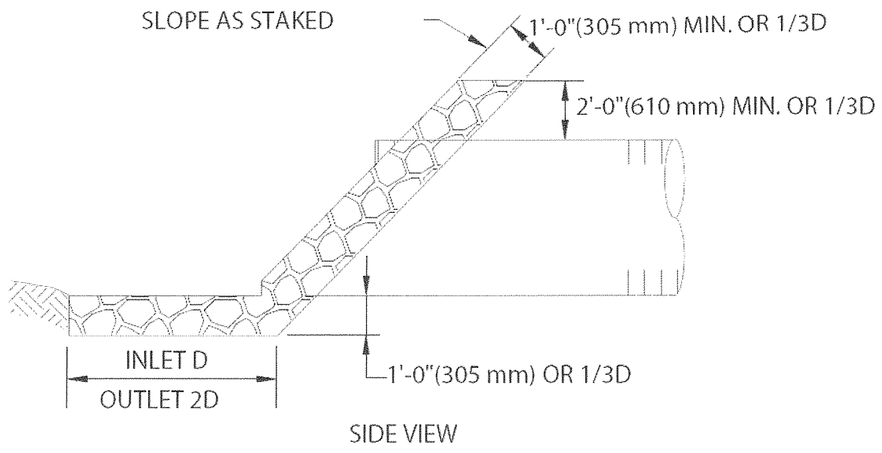



Figure 4. Cross section of culvert inflow and outflow.

## 2) Description of area where work is to take place including slope, distance from water, soil type, substrate and vegetation cover.

The Caution Creek crossing at the Division Road washed out in spring 2007. To restore vehicle traffic passage a temporary crossing was installed with a perched 26 inch culvert, rip rap and gravel (see attached pictures). On August 8th 2007, an assessment was completed and the stream was flowing at an approximate rate of 0.1 $m^3$/sec (4 $ft^3$/sec). The forest vegetation cover surrounding the stream is a black spruce/larch cover type with some willow and alder shrub cover. Flooding has caused some tree mortality adjacent to the stream, especially north (upstream) of the Division Road. Wash out areas have been colonized by horse tails and various grass species. Soils approaching the stream are a sandy loam texture and the stream bed is composed of mostly organic materials along with washed out sand and gravel. The slope of the crossing is very gentle and the culvert will be installed at grade.

Presently, the culvert is located about 13 feet to the west of the natural stream channel and is deflected by the road. Rip rap and silt fencing have been installed as preventative erosion measures.

## 3) Construction schedule, type of construction materials and equipment to be used:

After an Aquatic Habitat Protection Permit has been received, construction will occur in fall 2007 prior to winter freeze. To minimize disruption to traffic continuity, all required materials and equipment will be on site prior to the commencement of construction. Once construction begins, it will be continuous until the project is complete.

**Construction materials:**

- Rip Rap
- Granular foundation fill
- Geotextile and heavy gauge plastic lining material for coffer dam
- Culvert

**Equipment to be potentially used:**

- Water pumps
- Excavator
- Grader
- Bull dozer
- Gravel trucks

**4) Proposed measures to mitigate or prevent any potential impact of the activity on aquatic and riparian habitats, including erosion and sediment control plans:**

Every effort shall be made by the proponent to undertake the culvert installation works in such a way as to minimize impacts to downstream areas during the proposed project. As per Department of Fisheries and Oceans Canada recommendations, the following mitigations will be implemented:

- Downstream flows in the stream shall be maintained at all times during this project.

- The construction area shall be isolated from flows using a coffer dam to prevent flow through the work site during the culvert replacement project. The coffer dam shall be lined with geotextile or heavy gauge plastic to prevent erosion and leakage. Only materials free of silt or other fine sediment shall be used for this purpose; earthen berms are not to be used as coffer dams for this purpose. If necessary, the outside edges exposed to the channel flow shall be adequately protected from erosion with geotextile fabric, tarps or other suitable materials. All materials associated with the coffer dam shall be completely removed from the stream channel at the end of the project. If alterations to the natural streambed are required to install the coffer dam impacted areas shall be rehabilitated to pre-construction conditions such as reinstalling any removed cobble/rock back into those locations where they were removed or re-establishing the banks to their original width and shape and slope.

- If fish become trapped within the isolated/contained work area, no in-stream work within the contained area shall proceed until all fish are salvaged and released unharmed into the creek outside of the isolated work area.

- For any dewatering activities from within the isolated work area, the water shall be released into a well-vegetated area or settling basin and not directly back into the watercourse unless the water is clean. If necessary, the discharge area shall be armoured with clean rock, geotextile fabric or some other energy dissipating device to prevent erosion and scouring at the point of discharge.

- Pumps used to maintain downstream flows shall be of sufficient size to maintain pre-work stream flow volumes and auxiliary pumps will be available to accommodate any expected increased water levels due to storm events. In addition, a backup pump shall be on site and ready to use in the event of a pump malfunction. Any pumps left running all night shall be continuously monitored to ensure the pumps do not fail.

- All pumps used to provide downstream flows around the isolated work site or remove water from the isolated work area shall have a screen on the intake line to prevent the impingement or entrainment of fish during pumping activities.

- During construction every reasonable effort shall be made to minimize the duration of any in-stream works.

- If re-contouring of the stream bed is required during the project, every effort shall be made to minimize the size of the re-contoured area and the amount of sediment disturbance.

- All material (rock, gravel, etc.) used in this project shall be clean and free of fine sediments. All fill material shall be obtained from off-site and not from below the average annual high water level of any watercourse. If necessary, the rock rip rap shall be washed in a location where the wash water cannot enter fish habitat prior to installing it in the stream channel.

- All permanently removed materials shall be disposed of above the high water level, and located and stabilized so that they do not re-enter any watercourse. Spoil includes any excavated material such as sediment, vegetation, and woody debris. Spoil material shall not be left on the edge of the stream banks or the road embankment where it can re-enter any watercourse.

- Any stockpiled material shall be located and stabilized above the high waterline where it will not erode into Caution Creek.

- Whenever possible, all machinery undertaking in-water work shall do so from the existing road surface or top of the stream banks. No heavy machinery should need to enter the water at any time during this project unless it is within an isolated work area that has been salvaged of fish.

- Any soils that have significant potential for sediment delivery to the creek shall be stabilized immediately following activities at the site to minimize potential erosion.

- Appropriate precautions shall be taken to ensure that deleterious substances do not enter the watercourse:

- All heavy machinery shall be carefully inspected for leaks (and any detected leaks repaired) prior to being used during this project. All equipment operating in or near the stream shall be clean and if necessary, pressure washed off-site prior to the start of the project. In addition, any loose dirt or other debris shall be cleaned from all machinery prior to its use in and/or around the water.

- Equipment shall be free of external grease and oil and if necessary, the machinery should be pressure washed off-site prior to the start of the project.

- All machinery shall be equipped with emergency spill kits large enough to contain any possible spills or leaks of oil, fuel, hydraulic fluid or coolant during the project. The operators of the equipment should be familiar with how to properly use the spill kits in the event of an emergency.

- Any spilled materials shall be cleaned up as soon as possible and disposed of in an environmentally safe manner. Spilled material shall not be left where it may enter any watercourse.

- If these measures are insufficient for effective control, it is the responsibility of the proponent to implement alternative measures as required for effective deleterious substance control.

- During construction and until revegetation is sufficient to control sediment erosion on exposed areas, the Proponent shall ensure that effective sediment and erosion control measures are in place and that they are functioning properly and are maintained and/or upgraded as required to prevent sediment from entering the stream.

- On completion of the project, any portion of the stream bed disturbed by operations will be left in as smooth a condition as possible, with no ridges or depressions that could trap fish or initiate erosion of the stream bed or banks.

**5) Plans for restoring the environment after the proposed activity has been completed, including replacing or restoring vegetation.**

In the construction process every effort will be made to minimize the footprint of the operation. Machine traffic will follow the existing road/drainage ditch corridor and existing vegetation will not be cleared.

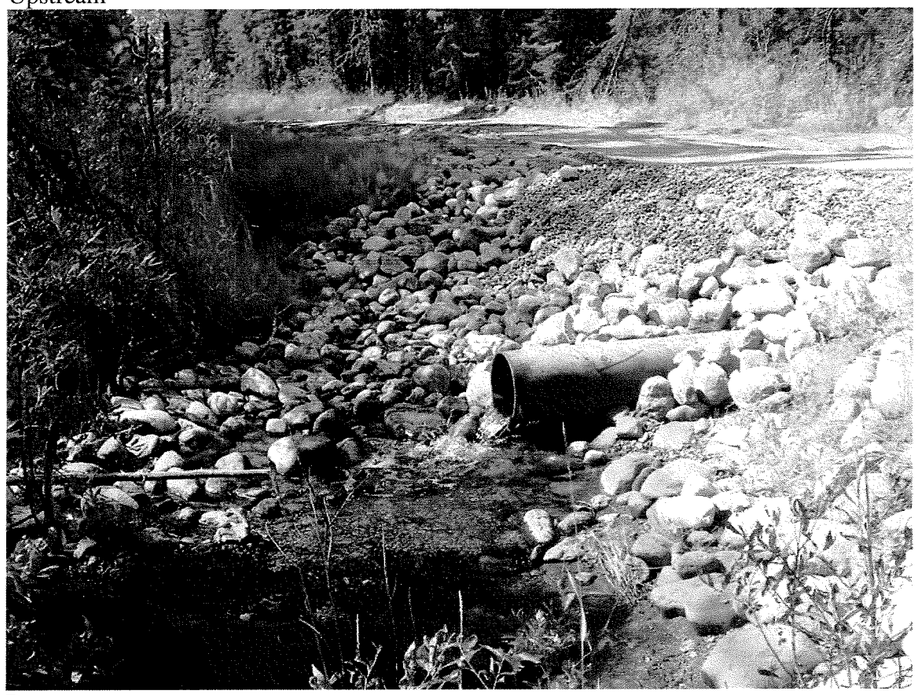
Sediment and erosion control will be achieved on all susceptible surfaces with geotextile covered with rip rap. All other surfaces will be smoothed to a gentle grade and left to revegetate naturally. The ability of the site to revegetate naturally has been demonstrated this spring, where washed out materials have already been colonized by horse tails and various grass species.

# Pictures

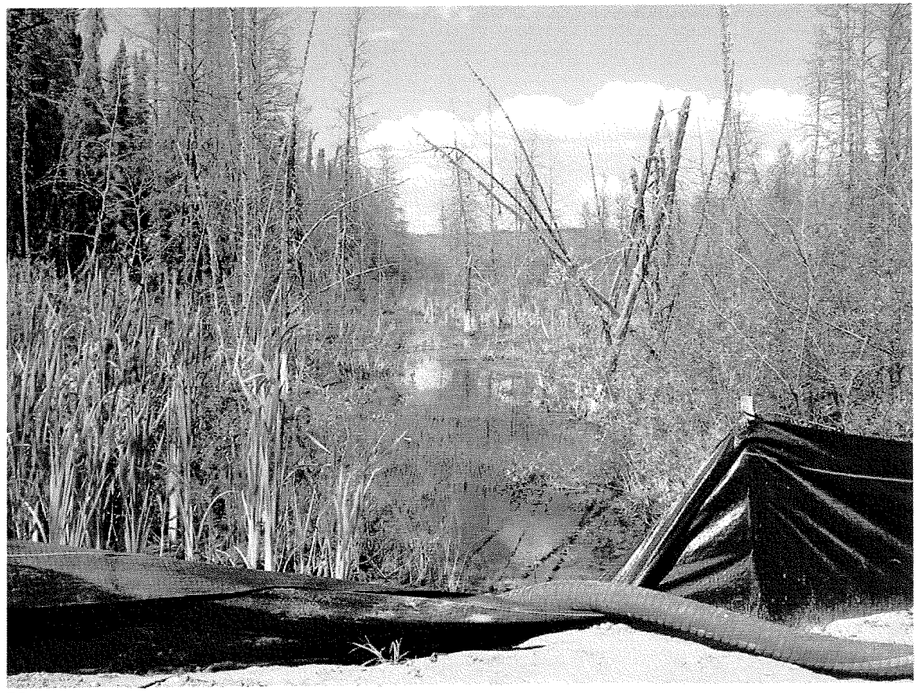
Approach facing east

Approach facing west

Upstream



Downstream



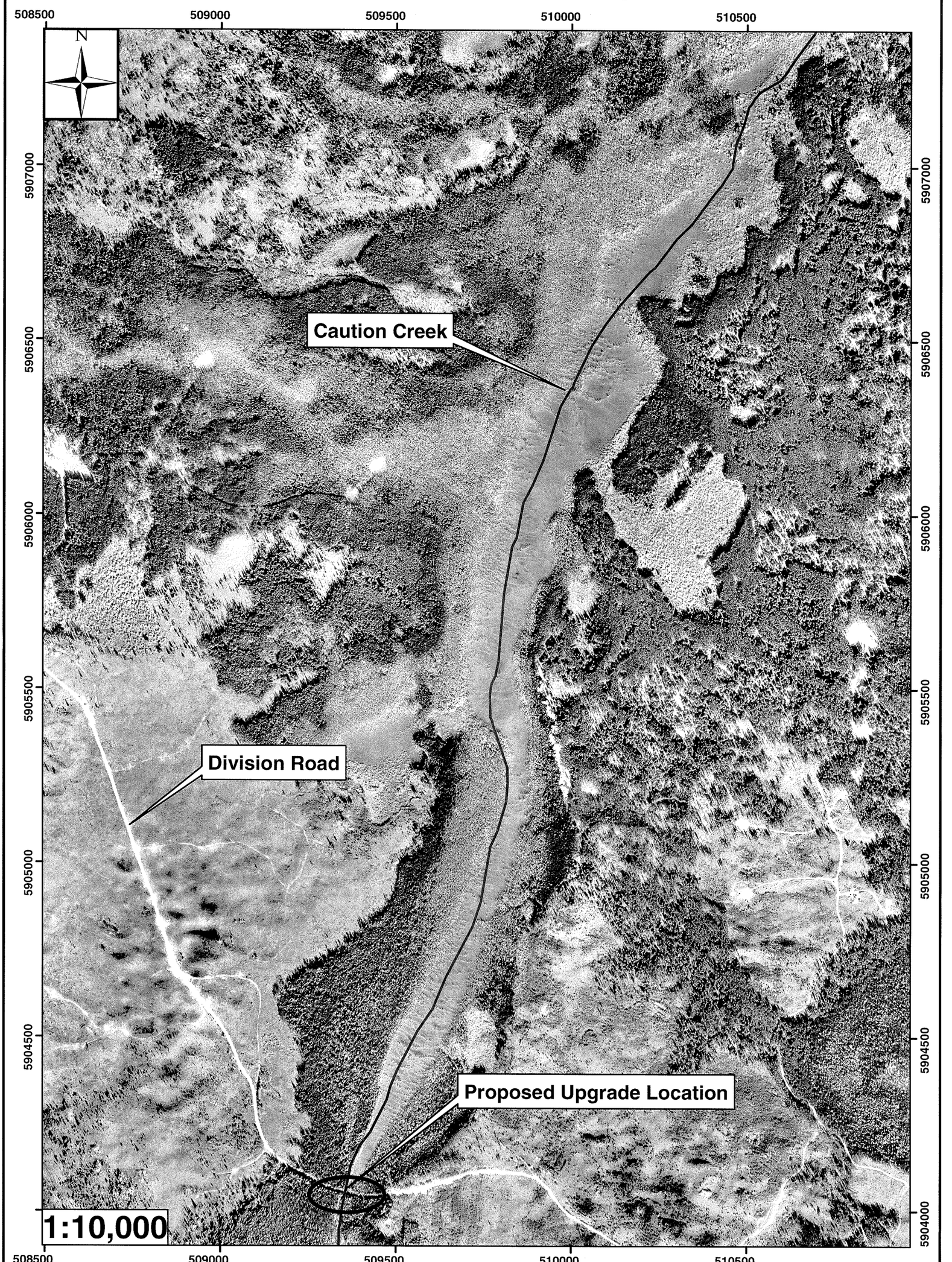
Upstream

Downstream

Outlet

# Map

# FALC Caution Creek Crossing Upgrade Proposal

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