

11.0 ASSESSMENT OF PROJECT IMPACTS, MITIGATION REQUIREMENTS AND RESIDUAL EFFECTS

The following sections of the Yellowjacket Gold Project Small *Mines Act* Permit Application describes the likely effects of the Project on the environment, the cumulative environmental effects, the potential for accidents and malfunctions, and cumulative effects. The timeframe applicable to this assessment is the entire mine life, including construction, operations, reclamation/decommissioning and closure. Based on current production forecasts the mine life is projected to be seven years (refer to Section 5.2).

The Yellowjacket JV has used the following six-step process as recommended by Hall, 2006.

Step 1:

Describe the project facilities and activities.

Step 2:

Identify and describe those components of the project setting (environmental, socio-economic, heritage, etc.) that will be or could be affected by project development including itemization of mine components and project setting.

Step 3:

Describe the nature and extent of the impact of any interaction between the project and the existing project setting.

Step 4:

Describe proposed measure(s) available to manage the impacts identified above.

Step 5:

Identify the magnitude, frequency, duration, extent (geographic or otherwise) and reversibility of any residual effects of the project after mitigation measures are applied.

Step 6:

Assess the significance of any residual effects.

The assessment covers the following components:

- Open pit;
- Placer sluicing operation;
- All infrastructure contained related to the concentrator and ore processing facilities;
- Tailings distribution system and settling ponds; and
- Site roads, including the Surprise Lake road.

**Table 11-1
Level of Impact After Mitigation Measures (Hall, 2006)**

LEVEL	DEFINITION
HIGH	Potential impact could threaten sustainability of the resource and should be considered a management concern. Research, monitoring and/or recovery initiatives should be considered.
MEDIUM	Potential impact could result in a decline in the resource to lower-than-baseline, but stable, levels in a study area after mine closure and into the foreseeable future. Regional management actions such as research, monitoring and/or recovery initiatives may be required.
LOW	Potential impact may result in a slight decline in resource in a study area during the life of the mine, but research, monitoring and/or recovery initiatives would not normally be required.
MINIMAL	Potential impact may result in a slight decline in resource in a study area during the construction phase, but the resource should return to baseline levels.

11.1 Effects Assessment – Project Construction

Facilities and equipment that will be utilized under the proposed Small *Mines Act* Permit are already in place and on site. The only new activity addressed under construction is a legal survey of the immediate mine area. This survey is required under the *Mineral Tenure Act* and the Small *Mines Act* Permit approval as part of the process of converting some of the mineral tenures to a mining lease status. Surveying will involve the accurate locating of the boundaries of the Yellowjacket Gold Project area and delineating infrastructure and topographic/geographic features within the project area that can be used for reference. The physical survey will involve a small team under the direction of a Registered BC Land Surveyor. The survey team will enter the project area and conduct low impact activities including walking through the project area, marking trees with spray paint if applicable and establishing a small number (3 to 4) of geographic reference points using survey monuments. The majority of surveying will take place in the disturbed placer area. There may be potential for light disturbance to vegetation with no residual impacts. The overall Level of Impact for the construction phase is minimal.

11.2 Effects Assessment – Project Operation and Maintenance

Activities during full operations are described in detail in Sections 5 and 6 and relate to the operation of a small scale, <75,000 ton per year open pit gold mine and a 350 tonne per day conventional gravity concentrator. The only concerns identified during the operation and maintenance stage are effects from a hypothetical fuel spill or accidental fuel discharge, and potential for sediment release. The potential effects from either a fuel or sediment discharge incident is low to minimal.

Fuel Spill

The highest risk point for accidental fuel discharge into the environment is either at a transfer point, for example when mobile equipment is being refuelled, or from a breach of a fuel storage tank. If a spill occurs at a creek crossing or adjacent to a waterway, fuel could potentially enter the waterway and could result in local environmental contamination. Similarly, if the spill occurs onto the ground surface, there may be potential for contamination of the placer gravels and possibly groundwater.

Emergency response and contingency plans will be in place for the project. Preventive measures will be taken to reduce the chance of a spill occurring at transfer points and the approaches to the bridge over Pine Creek will be clearly marked with signage to indicate the locations of the bridge abutments. Spill kits will be available on trucks to allow the drivers to respond to emergency spills during transport, and all contractors must maintain an Emergency Response Program. Additional spill response equipment will be located at strategic locations and communication protocols will provide for quick response to spills.

Sediment Discharge

During mining and milling operations, water generated through dewatering of active pits and tailings from the gravity mill will be placed into tailings and/or settling ponds. Plant process water will be sourced from a small containment pond, which will be constructed near the plant site within the surficial gravel materials. The process plant is designed with a requirement for a constant clean (gland) water feed.

The hydraulic conductivity (K) values for the facilities following placement of tailings containing clay/carbonate materials from the processed bedrock material is estimated between 10^{-6} m/s and 10^{-8} m/s. This clay/carbonate combination will seal off the facilities and provide sufficient seepage to ensure that a majority of the water input into the facilities will exfiltrate into the surrounding surficial materials and not be collected. Based on the processing completed in 2008, the retention time of water within the facility was adequate to ensure that the tailings supernatant discharges were sufficiently low in TSS to meet regulations.

A water quality monitoring site at PC-6 (see Section 9.2) was set-up in March 2009, to monitor and ascertain if there are any impacts from the project area, particularly the tailings facilities. In addition, the tailings pond borders will be inspected on a daily basis to identify any sediment discharge into Pine Creek and if this occurs remedial action will be taken immediately.

There has been no water chemistry assessments completed on the tailings supernatant for the project. However, in 2009 the company is initiating water chemistry analysis and monitoring on the supernatant during operations. It is expected to be of an acceptable quality based on the ML/ARD characterization

completed by Lorax to date. The tailings solids, like the supernatant, have not been previously characterized; however recently collected samples are currently undergoing ML/ARD and grain size characterization analyses.

An additional potential source of sediment discharge would be through a breach of the tailings distribution line. The most significant potential impact would be a rupture in the tailing line where it crosses Pine Creek, allowing direct discharge of tailings into the creek. As outlined above, from historic characterization of ML/ARD the values are anticipated to be acceptable and there would be no direct environmental damage from a tailings discharge. In addition, the short-term input of suspended solids would be entering a de-regulated creek that has seen extensive placer tailings discharge for over 100 years.

In order to reduce the risk of a tailings line breach, the tailings line will be double walled where it crosses the bridge over Pine Creek. In addition the location of the tailings line will be clearly marked with brightly coloured monuments or signage in order to reduce the risk of a rupture by mechanical means.

Socio-economic Considerations

The Socio-economic Considerations assessment covers the effects resulting from the operation of the Yellowjacket Gold Project. The main reference document for referral is the *Northwest BC Mining Projects Socio Economic Effect Assessment July 2005*.

The only geographic area that will be directly affected by the proposed small scale mining operation will be the town of Atlin and its direct environs.

In general terms the employment characteristics of the Atlin region can be described as:

- Employment rate slightly below the BC average;
- High percentage of part time and seasonal employment; and
- Average income below BC average.

The project is expected to generate approximately 15 direct seasonal positions for four to 6 months per year from the local workforce. In addition there will be opportunities for local heavy equipment contractors and other suppliers to provide services for the project. All of the local workers will benefit from being able to remain in the community during their term of employment.

Approximately 25% of the workforce (4 to 6 persons) will be commuting to the jobsite on a proposed 4 weeks in / 2 weeks out schedule. This type of commuter workforce will have the same impact on the local economy and socio-economic fabric as the seasonal placer mining activities. There will be positive economic benefits in terms of local purchases and use of local services.

11.3 Effects Assessment – Project Decommissioning

During mining operation and post-closure, the disturbed areas will be reclaimed using the stripped placer gravels as the ultimate surface. Willows will be planted on the tailings ponds.

Post-closure, all of the physical and mechanical components of the milling operation will be removed, as well as any other infrastructure erected as part of the mining operation.

No effects on heritage or cultural resources, Traditional Use or other values identified by the TRTFN are expected after reclamation. Visual effects will be identical to the pre-mining landscape, with improvements expected due to rounding and blending of the surficial gravels into the existing landscape.

Environmental monitoring and sampling of Pine Creek below the mining operation and the tailings ponds will continue for a reasonable length of time after the mining operation is finished, to ensure that there are no negative impacts on the local water quality and environment.

The increase in trained workforce may provide some lasting positive effect.