

Blackwater Gold Project Fish Habitat Compensation Plan Summary

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Project Background

BW Gold Ltd., a wholly-owned subsidiary of Artemis Gold Inc., proposes to develop the Blackwater Gold Project, an open pit gold mine in central British Columbia southwest of Vanderhoof (Figure 1). Impacts of the Project on fish and fish habitat have been minimized through design and mitigation measures, however there is expected to be some loss of fish habitat as a result of the Project. A Fish Habitat Compensation Plan has been developed for approval by Environment and Climate Change Canada to avoid, mitigate, and offset the direct loss of fish habitat in watercourses which will be impacted specifically by the mine's tailings and stockpiles: the upper parts of Davidson Creek and Creek 661 and their tributaries (Figure 2). All other impacts to fish and fish habitat are addressed with a Fish Habitat Offsetting Plan which will be submitted for approval by Fisheries and Oceans Canada (DFO).



Figure 1: Blackwater Gold Project Location

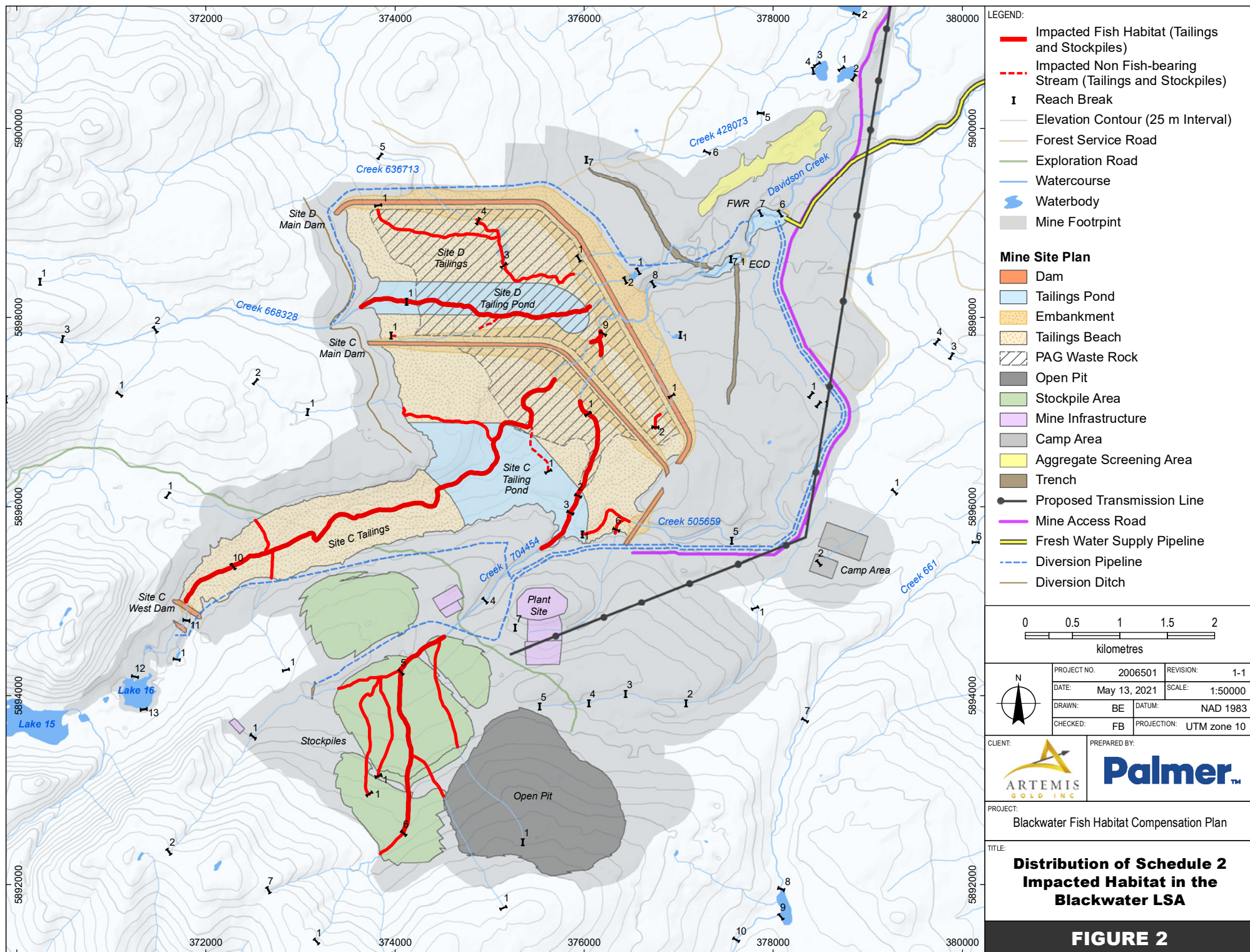


FIGURE 2

Fish Habitat Existing Conditions

Rainbow trout is the only fish species found in upper Davidson Creek and Creek 661. The small, headwater streams in the upper parts of these watercourses provides some habitat for juvenile rainbow trout, but good-quality habitat is more abundant in the middle and lower parts of the watercourses which will not be impacted by tailings and stockpiles. The value of the upper parts of Davidson Creek and Creek 661 to rainbow trout is generally limited by small stream size, steep gradients, cold water temperatures, and a lack of overwintering habitat. An overview of the amount of habitat expected to be impacted by tailings and stockpiles is provided in Table 1 below. The habitat quantities are provided as the total area affected in square meters (m²), and as habitat units which reflect the affected in-stream area adjusted to account for the quality of habitat the area provides. Streamside vegetation (also known as riparian vegetation) affected area was calculated as a 15 m buffer on both sides of a stream.

Table 1: Summary of Instream Area and Habitat Units Impacted by Tailings and Stockpiles

Watercourses	Length (m)	Instream Habitat Area (m ²)	Rainbow Trout Habitat by Life Stage (HU)					Total Habitat Units (HU)	Riparian Area (m ²)
			Spawning / Egg Incubation	Fry Summer Rearing	Juvenile Summer Rearing	Adult Summer Foraging	Over-wintering		
Davidson Creek mainstem and tributaries	23,842	47,506	14,446	12,751	14,107	0	5,575	46,879	444,864
Creek 661 tributaries	864	929	0	0	246	0	0	246	8,635
Totals	24,706	48,435	14,446	12,751	14,353	0	5,575	47,125	453,499

The larger, more productive lower sections of Davidson Creek and Creek 661 that support seasonal Kokanee spawning runs will not be directly affected by tailings and stockpiles.



Figure 3: Kokanee (left) and rainbow trout (right) caught during Project baseline studies, 2011-2012

Fish Habitat Compensation

Fish habitat compensation measures have been designed to offset the loss of in-stream fish habitat and streamside vegetation in upper Davidson Creek and Creek 661. The compensation measures consist of restoring and enhancing degraded fish habitat and constructing new fish habitat in a section of nearby Mathews Creek (Figure 4), within the same Nechako River watershed as the mine.

Mathews Creek has been degraded by intensive cattle grazing and other agricultural activity over many years. The stream bed and banks have been trampled by cattle, streamside vegetation has been lost, and abandoned material in the stream has affected fish passage. Table 2 provides an overview of the types of degradation that will be restored and enhanced.

Restoration and enhancement of Mathews Creek will create high-quality feeding, migrating, and rearing habitat for rainbow trout and the other fish species that live in Mathews Creek. Construction of three new off-channel ponds will create new deep areas that will not freeze to the bottom over winter, allowing fish to survive during cold periods. The new and enhanced habitat will benefit rainbow trout and the many other species that live in the Mathews Creek watershed, including burbot, brassy minnow, slimy sculpin, longnose dace, and white sucker. Figure 5 shows the location and extent of new habitat construction,

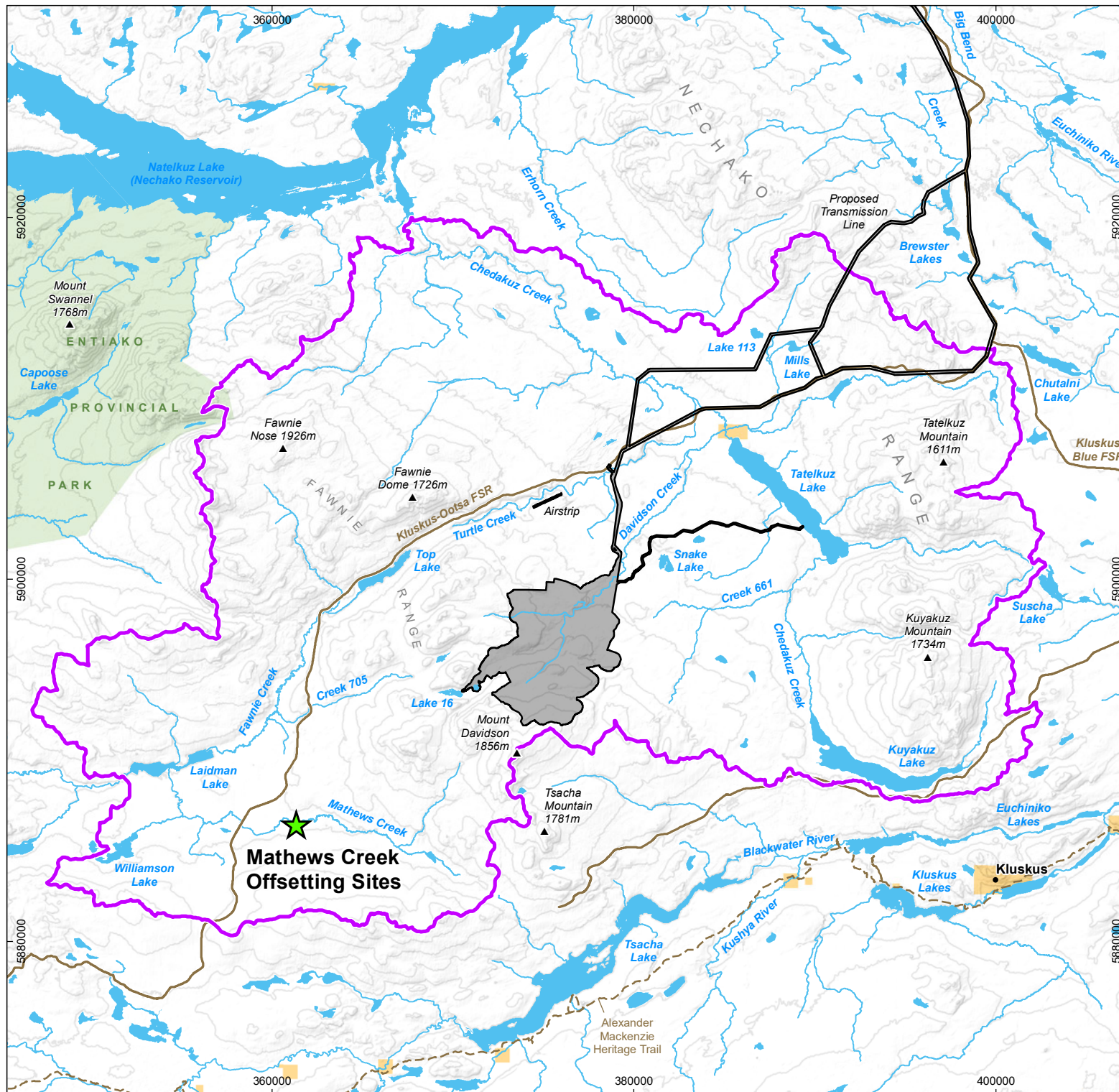
Table 3 provides an overview of the amount of habitat expected to be created by implementation of the compensation measures, and Table 4 presents the overall habitat balance of losses and gains.

These compensation measures will create approximately two times more usable in-stream rainbow trout habitat in Mathews Creek than will be impacted in upper Davidson Creek and Creek 661 by the mine's tailings and stockpiles. New riparian habitat will be smaller in area than what is impacted by the project, but the compensation plan will provide more value overall because it will provide higher quality in-stream habitat in Mathews Creek.

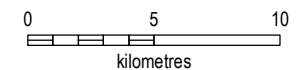
Long-term monitoring of the compensation habitat areas, including fish sampling, vegetation surveys, and water chemistry sampling will be carried out to ensure that the habitat is stable and functioning as intended. If the compensation measures are determined to be ineffective, alternative measures would be proposed by BW Gold Ltd to ensure that appropriate habitat compensation is achieved.

Blackwater Gold Project
Fish Habitat Compensation Plan Summary

Overall, these compensation measures will offset the impacts of the Project's tailings and stockpiles and will provide a net benefit to the fish community in the Nechako River watershed.



- LEGEND:
- ★ Offsetting Site
 - Populated Place
 - ▲ Spot Height
 - Heritage Trail
 - Elevation Contour (100 m interval)
 - Watercourse
 - Waterbody
 - Indian Reserve
 - Park or Protected
 - Mine Footprint
 - Regional Study



PROJECT NO.	2006501	REVISION:	1-1
DATE:	May 13, 2021	SCALE:	1:300000
DRAWN:	BE	DATUM:	NAD 1983
CHECKED:	FB	PROJECTION:	UTM zone 10







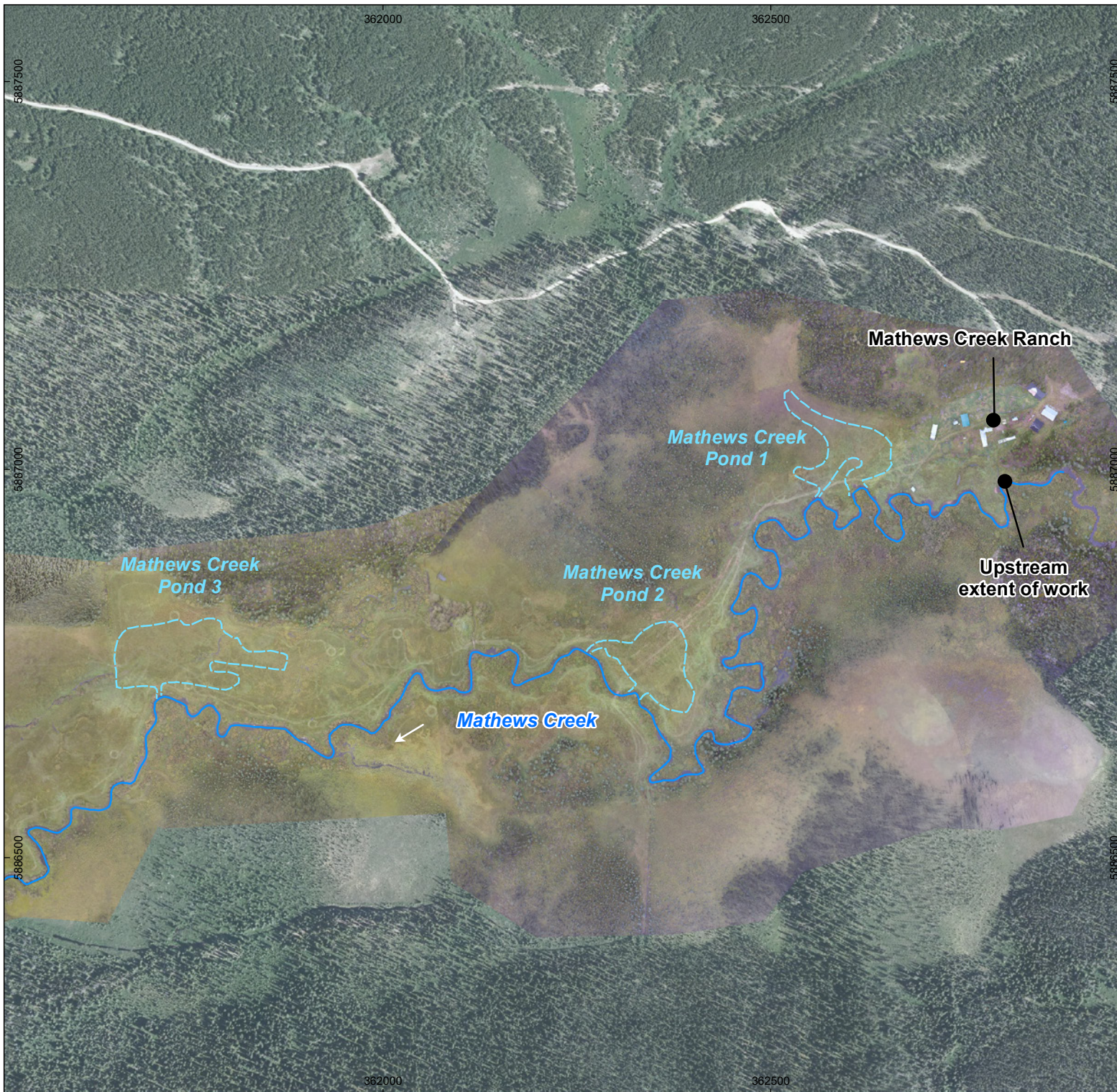
CLIENT: PROJECT: Blackwater Fish Habitat Compensation Plan

TITLE: **Proposed Offsetting Locations**

FIGURE 4

Table 2: Degraded Habitat to be Enhanced and Restored in Mathews Creek

Cattle Trampled Banks and Bed	Dilapidated Bridge Crossings
<p>Cattle have trampled channel banks and bed while grazing and watering, which has led to a lack of a defined channel, over-widening, fine sediment input, and/or lack of riparian vegetation.</p>	<p>Small machinery and livestock historically crossed Mathews Creek at haphazard wooden crossings, which has degraded the channel banks and bed and negatively impacted fish passage.</p>
	
Exposed Channel Banks	Flow Obstructions/ Impediments
<p>Erosion and lack of bank or riparian vegetation has led to exposed and over-steepened channel banks. This has led to rapid bank erosion and slumping, and increased sediment inputs into the channel.</p>	<p>Natural (e.g. beaver) and human-made woody debris jams other materials (e.g., failed crossing structures) has caused upstream ponding of water, excess sedimentation, and fish passage issues.</p>
	



LEGEND:

- Pond Outline (Approximate)
- Watercourse Centreline
- ← Flow Direction (White Arrow)

0 5
kilometres

Kluskus-Ootsa FSR

Mine Footprint

Map Extent

0 100 200 300
Meters

	PROJECT NO.	2006501	REVISION:	1-1
	DATE:	May 13, 2021	SCALE:	1:7000
	DRAWN:	BE	DATUM:	NAD 1983
	CHECKED:	FB	PROJECTION:	UTM zone 10

CLIENT:		PREPARED BY:	
PROJECT:		Blackwater Fish Habitat Compensation Plan	
TITLE:		Mathews Creek Offsetting Measures	

FIGURE 5

Table 3: Summary of Instream Area and Habitat Units Gained from Compensation Measures

Compensation Measures	Area Gain (m ²)	Rainbow Trout Habitat Units (HU)					HU Totals	Riparian Area (m ²)
		Spawning / Egg Incubation	Fry Summer Rearing	Juvenile Summer Rearing	Adult Summer Foraging	Overwintering		
Mathews Creek Restoration and Enhancement	-1,560 ¹	0	1,531	8,261	8,551	6,199	24,542	48,467
Mathews Creek Pond 1	7,409	0	1,394	5,578	5,578	5,578	18,128	9,850
Mathews Creek Pond 2	7,500	0	1,411	5,646	5,646	5,646	18,349	6,750
Mathews Creek Pond 3	13,015	0	2,449	9,797	9,797	9,797	31,840	11,105
Totals	26,364	0	6,785	29,282	29,572	27,220	92,859	76,172

Notes:

1. The loss of area in the Mathews Creek channel is the result of narrowing the unnaturally over-widened existing banks that have been trampled by cattle. The decrease in instream area is balanced by the increase in habitat quality, demonstrated by the net gain of habitat units.

Table 4: Habitat Balance After Implementation of Compensation Measures

Compensation Measures	Habitat Units Gained	Riparian Area (m ²)
Total Losses (from Table 1)	47,125	453,499
Total Gains (from Table 3)	92,859	76,172
Ratios (Gains:Losses)	Instream Area	Riparian Area
	1.97:1	0.17:1