

**Manh Choh Project Permittee
Responsible Mitigation Plan**

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Prepared for:



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MANH CHOH PROJECT PERMITTEE RESPONSIBLE MITIGATION PLAN

1.1 INTRODUCTION

Stantec Consulting Services Inc., (Stantec) working with Peak Gold, LLC (Peak Gold) staff collected wetland data and inventoried restoration and rehabilitation opportunities near the Manh Choh Project in 2020 and 2021 to off-set unavoidable impacts to wetlands for the development of the Manh Choh Project. Potential restoration sites were reviewed for the practicability of completing restoration, proximity to the impacted watershed, and the importance of the restoration site to the Native Village of Tetlin.

1.2 BACKGROUND

Peak Gold looked at numerous opportunities to offset the wetland losses at the Manh Choh Project. The Tanana Valley Mitigation Bank near Delta Junction does not have credits available. There are no other mitigation banks or In Lieu fee providers available in the service area. The only available method to meet compensatory mitigation requirements for the project is to prepare a Permittee Responsible Mitigation (PRM) plan.

As part of the PRM planning process Peak Gold reviewed the Alaska Department of Fish and Game (ADF&G) Fish Passage Inventory Database website and mapper (ADF&G 2021) to determine if there were State highway culverts in the area that were regarded as impediments to fish passage. Culverts were reviewed on the Taylor and Alaska Highways and Tok Cutoff. Numerous culverts listed in the database had already been replaced by the Alaska Department of Transportation and Public Facilities during road rehabilitation projects. The inadequate culverts that remain involve massive fill embankments under the road. These culverts replacements need to be done as part of a larger highway project to ensure adequate mineral material, to acquire legal right of way, and divert and control traffic. Because of these issues, the remaining potential culvert projects on State roadways near the Project area were determined to be impracticable because of costs and logistics.

The valley between the Tok River and the Tanana River is largely mapped by the National Wetland Inventory as wetlands. Numerous existing gravel pits are found along the Tetlin Village Road which runs through this area. The gravel pits along the Tetlin Village Road were found to be completely devoid of hydrology. There was no sign of groundwater in any material source. Without an intersecting water table, the material sources in this road reach are not good candidates for creation of wetlands and ponds. Field delineations by Stantec (2021) found that although numerous wetlands are found in the area, near surface saturation and groundwater (shallow water tables) were not found at any of the sample sites along the Tetlin Village Road.

The only option available was to find sites that warrant improved hydrologic connections on the Tetlin Village Road. This PRM plan describes how hydrologic connection enhancements will be completed at two locations to offset wetland fill losses proposed at the Manh Choh Project (Table 1).

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Table 1. Manh Choh Project Impacts

| Project Component | WOTUS Acres Impacted | Cubic Yards Fill in WOTUS | Fill Type |
|---------------------|----------------------|---------------------------|-------------------|
| Section 404 | | | |
| Manh Choh Twin Road | 3.8 | 6,130 | Clean Fill |
| Manh Choh Site Road | 0.01 | 16 | Clean Fill |
| North Pit | 0.3 | N/A | Excavation |
| South Pit | 0.5 | N/A | Excavation |
| Waste Rock Dump | 0.05 | 81 | Clean Waste Rock |
| Ditch/Spoils/Fill | 0.6 | 968 | Excavation/Spoils |
| Totals | 5.2 | 7,195 | |

It should be noted that the North and South pits, 0.3 acres and 0.5 acres, are excavation, not fill. In addition, 0.4 acres of wetlands near the ditch are not directly impacted by the project but are being permitted due to their location between the waste rock dumps and the ditch and the likelihood of disturbance. The wetland lost from fill is (5.2 acres - 0.8 acres) is only **4.4 acres** at the Manh Choh Project.

2.0 MITIGATION PLAN REQUIREMENTS

2.1 OBJECTIVES

The long-term goal of Peak Gold is to establish productive wildlife habitat upon completion of mining and reclamation at the mine site that aligns with the goals and land use objectives of the Native Village of Tetlin. Peak Gold established the following additional goals when looking for restoration and rehabilitation opportunities for the Manh Choh Project. On-site, in-kind wetland options were evaluated for the project location with the following objectives:

- Restore degraded stream channels and floodplains.
- Restore and enhance wetlands and streams in areas with self-sustaining hydrology.
- Remove barriers to fish passage and improve resident fish in degraded impacted stream reaches.

2.2 SITE SELECTION CRITERIA

Site selection to offset aquatic resources lost from the construction of the Manh Choh Project was driven by the desire to sustain and improve water quality and quantity within the same watershed as the project.

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The PRM sites in this report were selected based on the following factors:

- **Proximity to the mine site.** Restoration and rehabilitation opportunities need to be in or proximity to the impacted watershed.
- **Ability to create a long-term stable stream landform.** The restored aquatic habitats must be self-sustaining not requiring long term maintenance to be successful. The restoration also must match the existing landform supplying a hydrologic connection, channel, or swale that provides surface water flow.
- **Potential for site restoration success.** The restored aquatic habitats must be self-sustaining from naturally existing hydrologic inputs.
- **The timing of the mitigation.** Site restoration must take place during mining when equipment and resources are available locally. The rehabilitation work needs to be accomplished concurrently with mining at the Manh Choh Project.
- **Ecological site factors.** Restoration needs to increase aquatic habitat diversity, connectivity, to maintain Riverine Hydrogeomorphic wetland habitat. The goal is to provide habitat for ecologically and socio-economically important animal species, while contributing to water quality and quantity.

2.3 SITE PROTECTION INSTRUMENT

The sites selected are located on Native Village of Tetlin Land. The access road to the Native Village of Tetlin is the only land access to the village. No work on this road will take place without the approval of the Tribe. This is private land that will not be impacted by development without the consent of the Tribal government.

2.4 BASELINE INFORMATION

The wetlands and waters mapping for the Project was used when locating rehabilitation sites. Hydrologic connections were followed to roadways or perceived blockage. Consultation was completed with the Native Village of Tetlin to determine if they were aware of problem sites or restoration opportunities along the roadways or near the townsite. Two sites were recommended for review. The two sites are in the Kalutna River-Tanana River HUC 10 watershed. This watershed covers the lower elevations, to include the Tetlin Village Road corridor from the Alaska Highway and the base of the Tetlin Hills.

Wetlands are found within the riparian floodplain corridors associated with the two PRM sites. Dominant water sources are likely subsurface hydraulic connections. Groundwater discharge from surficial aquifers, overland flow from uplands and precipitation contributes additional inputs. Subsurface water flow has been confirmed at PRM Site #2 in the form of winter auefis that fills road culverts and contributes to erosional patterns.

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Figure 1 provides an overview showing the location of the two PRM sites in relation to the Manh Choh project and Tetlin Village Road.

PRM Site #1 is at the base of the Tetlin Hills, approximately mile 6 of the Tetlin Village Road. A wetland swale with a seasonal stream flows from the hills, meets the road, flows (at higher water levels) through two perched culverts downstream to a large wetland complex. The current culverts are perched, and only allow water to flow downstream during higher flow events. At lower volumes, water ponds and backs up on the upstream side of the roadway (Photo 1).

Photo 1: Perched Culverts at PRM 1 Site

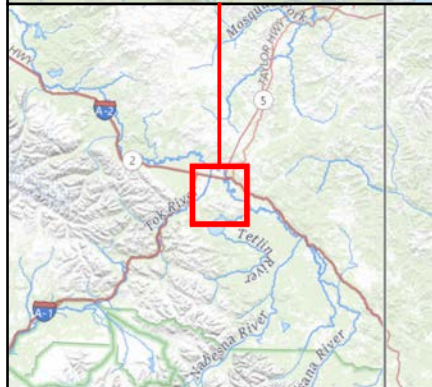
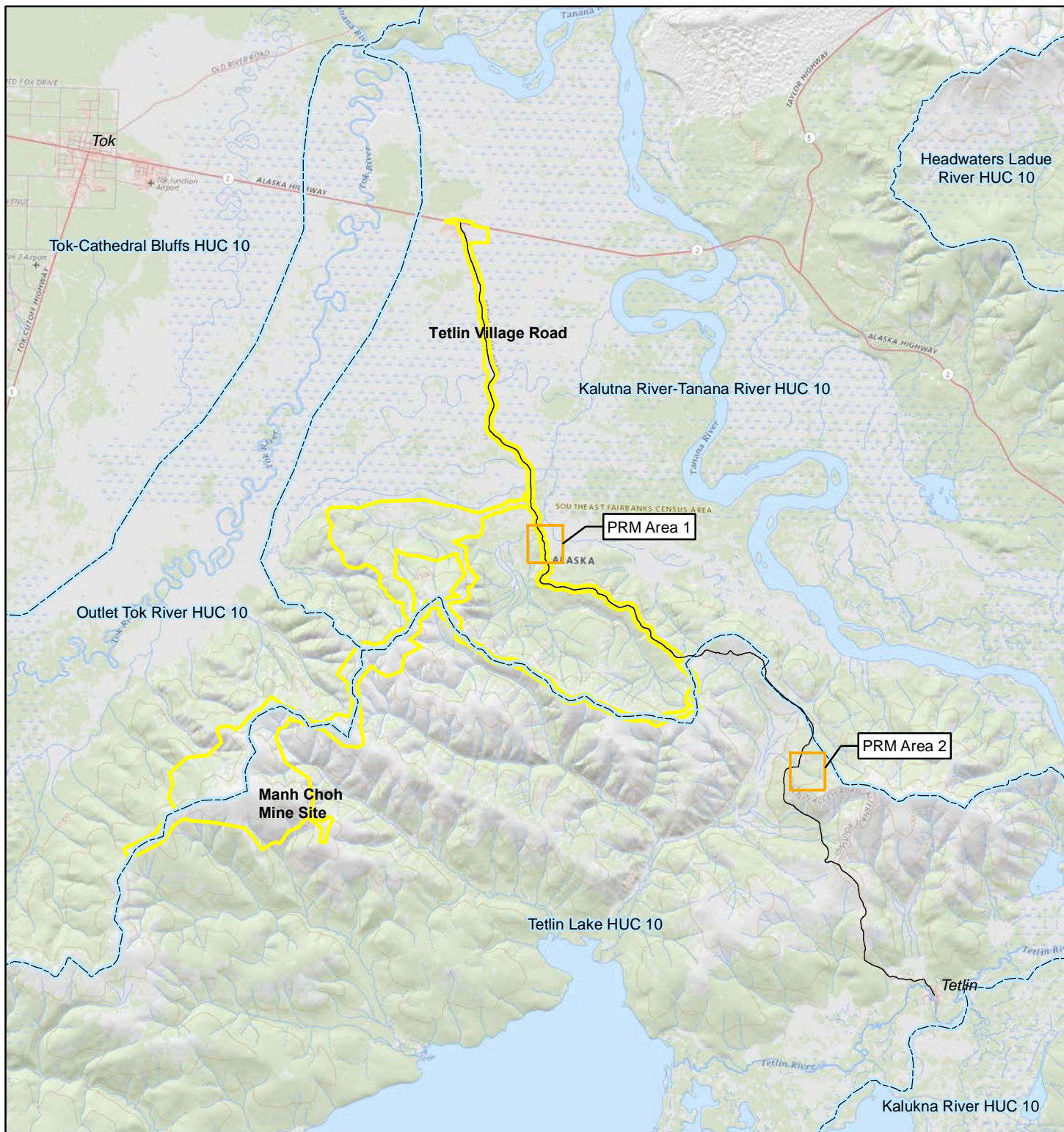


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PRM Site #2 is located higher in the hills where the adjacent wetlands receive seasonal flow from the hillside above it, but do not have a clear surface connection to the larger wetland complexes below. The wetland swale at PRM Site #2 is adversely affected by sediments that are eroding from the road cut above and filling adjacent wetlands (Photo 2). The wetlands in the swale are retaining sediment but are slowly filling. The current culvert has filled with sediment, creating ponding and overflow on the roadway. The adjacent drainage shown in Figure 3 south of this hillslope is also filling with sediment. PRM Site #2 will be designed to find a lasting solution to the aufeis and erosion issues, while enhancing the downstream wetlands with reduced sediment.

Photo 2: Road Sediment Potential Uphill from Wetland Swale





- PRM_Area
- Tetlin Village Road
- HUC 10 Watershed
- Wetland Study Area

0 6,400 12,800 19,200 Feet

(At original document size of 8.5x11)

1:150,000 1 in = 12,500 ft



Client Peak Gold LLC

Project Manh Choh Project

Figure **PRM Project Overview**

Figure Number

1

2.5 DETERMINATION OF CREDITS

A determination of credits is typically conducted when wetlands or waters are either created through PRM plans, or credits are purchased through a mitigation bank or In-Lieu fee program. The PRM plan presented here will replace poorly functioning culverts at two locations to off-set wetland impacts at the project site.

As noted previously, mitigation options in the watershed in the area are limited. By replacing poorly functioning culverts, downstream wetlands and waters will benefit. The goal of mitigation is to improve and enhance the water quality of the area through restoration and enhancement of the area waters. This project meets this objective, while providing benefits to the downstream wetlands and waters, and the local Native population through hydrologic improvements.

2.6 MITIGATION WORK PLAN

The mitigation work plan applies to the culvert replacement at PRM Site #1 and Site #2. The first step will be to survey each site and have a professional registered engineer size the culverts. It is anticipated locations could move several feet from current location to properly locate and bed culverts to match hydrologic flow. It is anticipated corrugated metal pipes will be used to replace each existing culvert. The culvert size and number will be determined by the engineer. The two drainages do not have the flow or habitat for fish, therefore no fish passage culverts are required. Culvert size and location will be determined based on the following process:

- Survey information to be collected included topographic features, drainage basin, expected flows, existing channel characteristics, high-water information, erosion, and/or thaw requirements.
- The culverts will be designed for the expected hydraulic flow for the basin.
- Culverts will be designed to accommodate debris, or appropriate design provisions will be added and shown in design.
- Culvert location and design will be completed in both plan and profile drawings. The design will minimize sediment buildup in culverts and maximize a normalized hydraulic flow. The design process will be documented.

The final culvert design and installation plan will be supplied to USACE for permitting prior to construction. Peak Gold will select a local contractor who will replace the culverts using the approved design.

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PRM Site #1

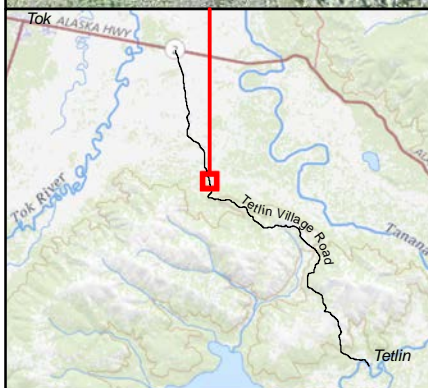
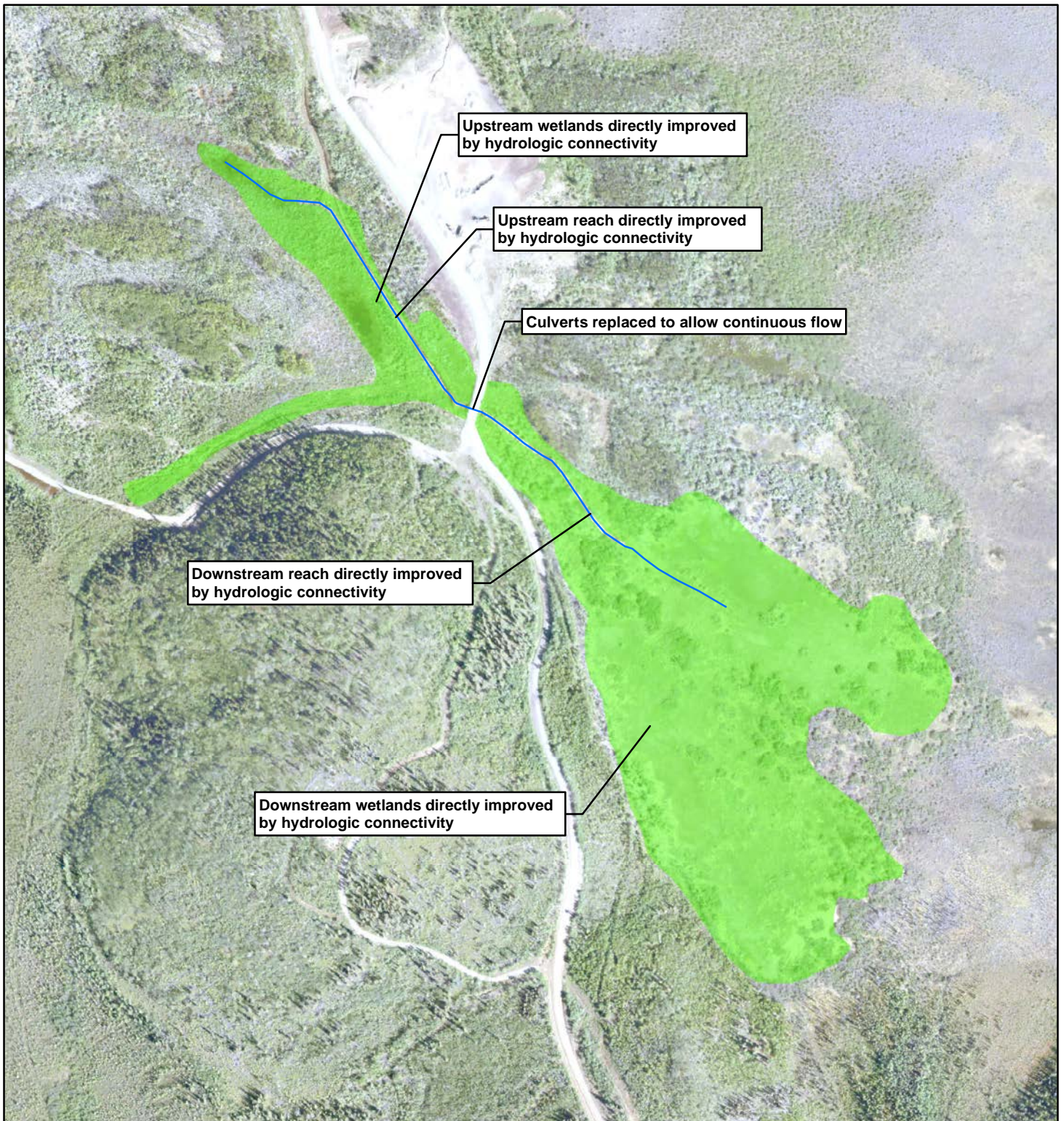
Figure 2 shows the area where culvert replacements will enhance downstream wetlands and waters. After the replacement of culverts at this location, the seasonal stream will be able flow uninterrupted to the east side of the roadway and into the larger wetland complex at the base of the Tetlin Hills. In addition, downstream overland flow from the seasonal stream will maintain soil moisture in the wider swale, likely reducing the encroachment of the deciduous shrubs and saplings along the outer edges of the swale. A better bank of culverts will also provide unobstructed flow during flooding events, both upstream and downstream of the road, based on spring breakup, snow melt, or overbank flooding from the Tanana River.



PRM Site #2

Figure 3 shows the area where culvert replacements will enhance downstream wetlands and waters for the PRM #2 site. Properly sized and placed culverts will allow overland flow to continue downstream without ponding or overflowing the roadway. Downstream wetland floodplains will receive less road based sediment, and vegetation growth should provide greater cover and diversity because of it.

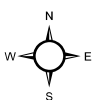
2.7 MAINTENANCE PLAN

The mitigation work plan is designed to eliminate the need for regular site maintenance. Culverts will be placed in stable non-eroding channels. Water management features will be included as appropriate to slow, distribute, filter, and prevent sedimentation of adjacent wetlands. No pumps will be used to regulate hydrology. The stream channel and the wetlands above and below the culverts will be inspected annually until performance standards are met. Any failures or deficiencies noted during the monitoring period will be reported and corrected as part of the Adaptive Management Plan. Channel geometry will be adjusted following adaptive management if winter ice adversely impacts surface flow. The road will be graded and watered as required for maintenance. Maintenance crews will watch for flow imbalance and excessive sedimentation and provide this information to Peak Gold.



 Stream
 Wetland

0 200 400 600 Feet
 (At original document size of 8.5x11)
 1:4,800 1 in = 400 ft



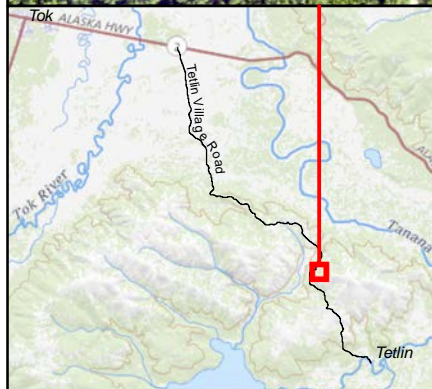
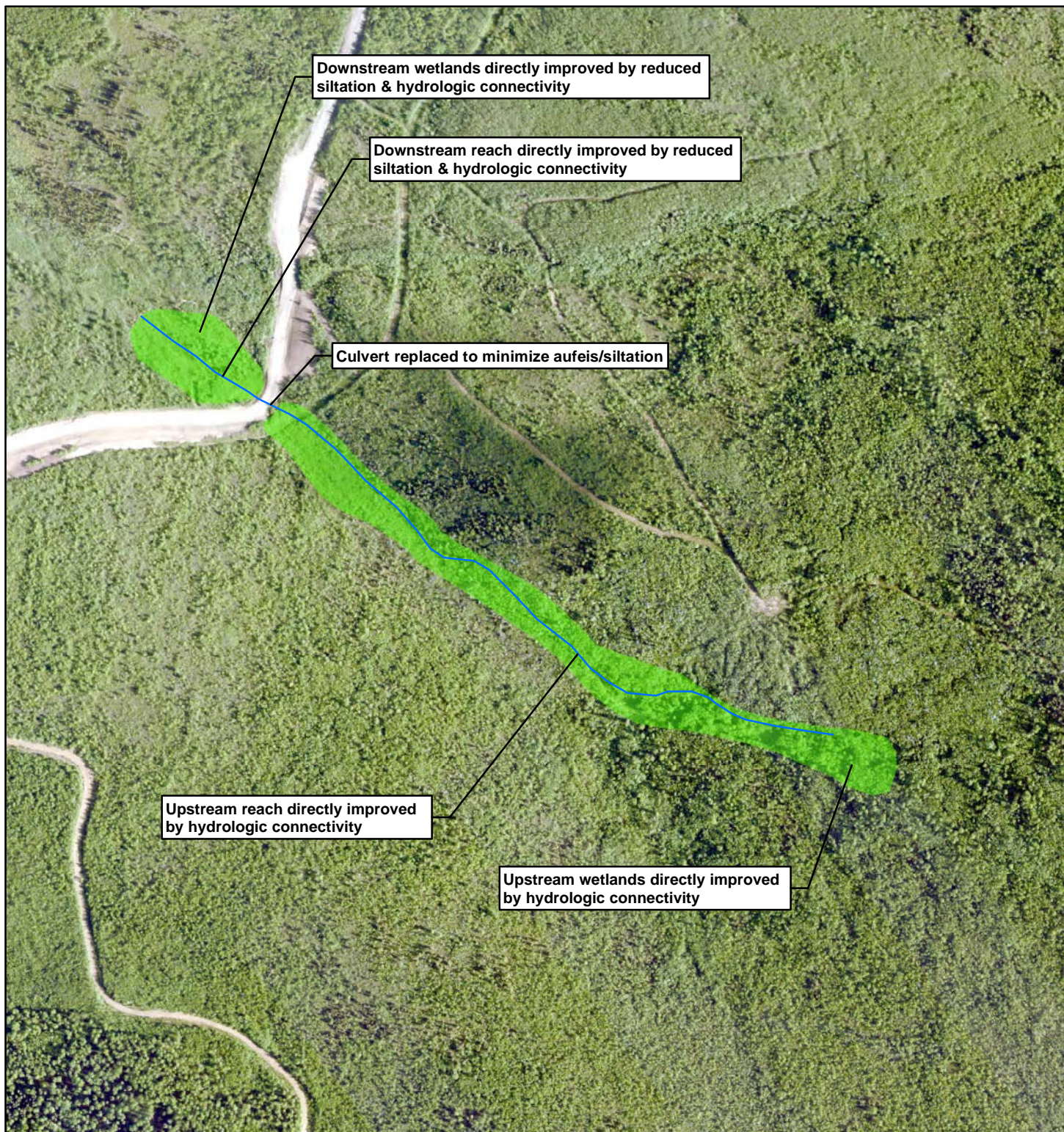
Client Peak Gold LLC

Project Manh Choh Project

Figure **PRM Project 1**

Figure Number

2



Stream

Wetland

0 200 400 600 Feet

(At original document size of 8.5x11)

1:4,800 1 in = 400 ft



Client Peak Gold LLC

Project Manh Choh Project

Figure **PRM Project 2**

Figure Number

2.8 PERFORMANCE STANDARDS

To determine the success of the culvert replacement and wetland enhancements, performance standards are proposed for the newly restored areas.

2.8.1 Hydraulic Flow Performance Standards

Ponding should not be present on the upstream side of the new culvert(s). The flow under the road should continue from higher gradient to the lower gradient. Monitoring for hydrologic indicators will occur on the upstream and downstream openings of new culverts. Stagnant water flow on the upstream side with ponding outside the limits of the stream channel are indicators flow is imbalanced and adaptive management is required.

2.8.2 Erosion Standards

Sediment and debris should not accumulate in the upstream side of the culverts from rainfall and high surface flow events. Erosion should be localized on the road embankments, not plugging culvert openings, or depositing in the barrel of culverts. If the culvert barrel has material in the bottom greater than the bedding material at construction this is an indicator erosion is excessive and adaptive management is required.

2.9 MONITORING REQUIREMENTS

2.9.1 Preconstruction Monitoring

Site monitoring will be completed for a year in advance of construction to verify seasonal variations in flow. Preconstruction site inspections will be conducted on a quarterly basis and will continue until construction takes place to establish a baseline of flow and condition data. Monitoring needs to be done in each season of the year. The preconstruction site information will be shared with the design engineers for project success.

2.9.2 Post-Construction Monitoring

Post-construction monitoring will take place following new culvert placement and construction. The monitoring will document the condition of the inlet, outlet, and hydrologic flow.

Photo points will be established at each culvert inlet and outlet during the first year of monitoring. Point locations will be monumented with a Global Positioning System. The open water and flow will be recorded. Inspection will note if new sediment is entrained in the culvert.

An annual monitoring update document will be prepared. The annual update will detail monitoring results at each site against the performance standards, provide analysis of the hydrological conditions, discuss

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conditions with the engineering team, noting any problems encountered, and if required a written plan will be prepared to correct issues. The monitoring updates will be on file with Peak Gold and available for inspection.

A final closeout report will be completed for the restoration when performance standards have been met at both sites for two successive years. The final report will be submitted to USACE and request closure of the post-construction monitoring period and agreement that the requirements of the PRM plan have been met.

2.10 LONG-TERM MANAGEMENT PLAN

During mine operation, Peak Gold and its consultants will review road conditions regularly. Seasonal post construction monitoring will be completed at the two culvert crossings to provide recommendations for improvement, to include site-specific recommendations (for example, the need of additional culvert length or rip rap). The seasonal monitoring will be reviewed for two successive years to determine if trends exist and if changes are recommended at the two PRM locations. If no changes are required after two years, the culverts will become the property of the Native Village of Tetlin, and maintenance becomes part of normal road operations.

2.11 ADAPTIVE MANAGEMENT

The goal of the Plan and adaptive management are the same; a successful project by developing, implementing, monitoring, adjusting, and seeking a positive resolution while adapting to onsite conditions. The PRM plan is designed to follow the cycle of Adaptive Management to meet Plan objectives. The restoration site will be monitored to determine if there are unanticipated site conditions such as excessive erosion, poor vegetation regrowth, or unexpected flow conditions that require correction.

The performance standards are used to measure and ensure onsite results are acceptable. If results are not acceptable, the long-term management plan is implemented to make changes at the restoration or rehabilitation site. It is the intent of this Plan to design the project, monitor the project, evaluate results, and redesign if required, starting the cycle again.

The Adaptive Management process is designed to allow for problem solving and adjustments during design, implementation, and long-term management. To have a successful project, Peak Gold will follow six steps in the Adaptive Management process (Figure 4). Within each step, several elements need to be completed.

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Adaptive management is a process of connecting and linking the information from the project design, implementation, construction, monitoring, and evaluation phases to ensure the initial design meets the standards and objectives. If monitoring demonstrates a corrective action is needed, Peak Gold will adjust the design to meet the performance standards for the project. Adaptive management continually evaluates the results and adjusts elements to meet the overall objective. Peak Gold is fully committed to this framework for a successful project completion (Ministries of Forests and Range 2008).

2.12 FINANCIAL ASSURANCE

Peak Gold has an agreement with the Native Village of Tetlin for the use of the land and to assist with road maintenance. Peak Gold will complete this PRM component as part of their agreement with the Native Village of Tetlin in compliance with their land lease and agreement.

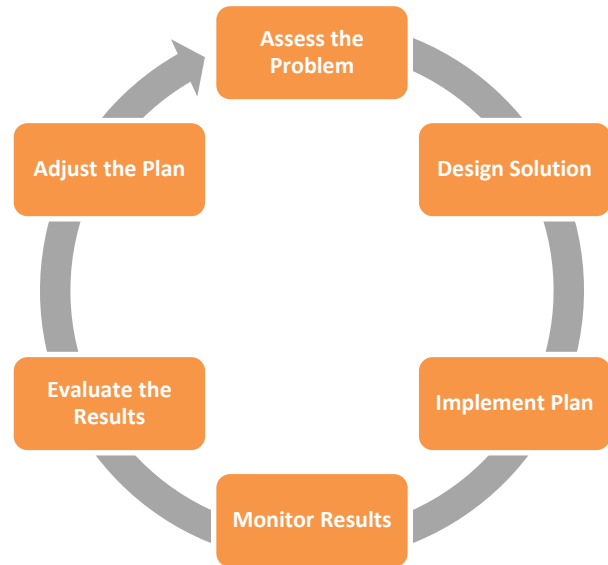


Figure 4. Adaptive Management Cycle (Ministries of Forests and Range 2008)

3.0 REFERENCES

- ADF&G 2021). The Alaska Fish Resource Monitor.
<https://adfg.maps.arcgis.com/apps/MapSeries/index.html?appid=a05883caa7ef4f7ba17c99274f2c198f>
- Ministries of Forests and Range (British Columbia, Canada). 2008. An Introductory Guide to Adaptive Management for Project Leaders and Participants. Retrieved from <http://www.for.gov.bc.ca/hfp/amhome/index.htm>.
- Stantec 2021. Manh Choh Project, Preliminary Jurisdictional Determination, Prepared for Peak Gold, LLC. December.
- USACE 2007. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region, (Version 2.0), ed. J.S. Wakeley, R.W. Lichvar, and C.V. Noble. ERDC/EL TR-07-24. Vicksburg, MS: U.S. Army Engineer Research and Development Center. September.