

## **Appendix B**

# **Reclamation Plan**

Anarraaq and Aktigirug Exploration Program

## **Phase I – Exploration Access Road and Surface Pad Construction**

Prepared for:

Alaska Department of Natural Resources  
Alaska Department of Environmental Conservation  
Northwest Arctic Borough

The Teck logo is rendered in a large, bold, black sans-serif font.

Prepared by:

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**October 2022**

This document originally dated April 2022, and submitted to ADNR on May 9, 2022, has been modified to include updated reclamation costs and acreage values to reflect updated designs for access roads to material sites AA-MS-1 and AA-MS-4.

The modifications to this document include:

- 1) Changing Table 3 by increasing the total acreage disturbance for Access and Secondary Roads from 101.6 acres to 116.1 acres, material sites to 44.2 acres and pads to 53.1 acres to be consistent with the SRCE model figures. This increases the total disturbance acreage disturbance to 213.4 acres.
- 2) Changing Table 7 by increasing reclamation costs to reflect the modified road designs to material sites AA-MS-1 and AA-MS-4. The total reclamation cost increased from \$5,430,957 to \$5,535,456.
- 3) Appendix I to this Reclamation Plan has been modified to reflect updated access road designs for material sites AA-MS-1 and AA-MS-4, including:
  - a. The date on the cover page has been changed from April 2022 to October 2022
  - b. Table 1 has been modified to include disturbance acreage for updated access road designs for material sites AA-MS-1 and AA-MS-4 and for consistency with SRCE Figures.
  - c. Table 2 has been modified to reflect the higher reclamation costs related to the updated access road designs for material sites AA-MS-1 and AA-MS-4. The total reclamation cost increased from \$5,430,957 to \$5,535,456.
- 4) Appendix II to this Reclamation Plan has been modified to reflect updated access road designs for material sites AA-MS-1 and AA-MS-4, including:
  - a. SRCE Drawings 1,3 and 5 have been modified to reflect the updated access road designs for material sites AA-MS-1 and AA-MS-4.

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Appendix I – Basis for the SRCE Model

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## ABBREVIATIONS

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
ADNR	Alaska Department of Natural Resources
AS	Alaska Statutes
BMP	Best Management Practices
CMP	Corrugated metal pipe
DMLW	Division of Mining, Land and Water
Plan	Reclamation Plan
Project	Anarraaq and Aktigiruaq Exploration Program
RDM	Red Dog Mine
SRCE	Standard Reclamation Cost Estimate
TAI	Teck American Incorporated

### Units of Measure

ft	foot/feet
yd <sup>3</sup>	cubic yards

# **1 INTRODUCTION, APPLICANT INFORMATION, RECLAMATION REQUIREMENTS & SCOPE OF RECLAMATION PLAN**

## **1.1 Introduction**

Teck American Incorporated (TAI) is proposing the development of a two-phase exploration program to evaluate the economic and technical feasibility of mining lead-zinc resources identified near upper Ikalukrok Creek and the Red Dog Mine (RDM) in northwest Alaska, known as the Anarraaq and Aktigiruaq prospects (See Figure 1). The Project consists of two phases. Phase I proposes the development of the main exploration access road, surface pads, and secondary roads to access the surface pads, and material sites. Phase II will include the construction of surface and underground facilities and other regulated activities associated with the underground exploration program.

TAI is committed to protecting the environment and the people living near the Anarraaq and Aktigiruaq Exploration Program (Project) area. As part of this commitment, TAI has developed this Reclamation Plan (Plan) which details the orderly closure of the Project and reclamation of all disturbed areas.

This document presents a comprehensive Reclamation Plan specific to Phase I of the Project including the reclamation of all roads (access and secondary access), surface pads (e.g., laydown pads, camp and portal pads, and vent-raise pads), and material sites. This surface development represents the first phase of a multi-year exploration program. Construction of surface facilities and the underground development in support of this exploration will be permitted later, as Phase II, and the reclamation of those components of the Project will be addressed in a future Reclamation Plan or amendment to this Plan. This Reclamation Plan is limited to describing the reclamation of all components of the Phase I program should the Project not proceed to Phase II for some reason.

This Plan meets all the State of Alaska requirements, as provided by AS 27.19 and 11 AAC 97, for reclamation and reclamation bonding and is intended to present the proposed reclamation activities in sufficient detail for regulatory agency review and approval.

The purpose of this Reclamation Plan is to provide guidelines for implementing reclamation procedures for the roads, surface pads, bridges and material sites associated with Phase I of the proposed Anarraaq and Aktigiruaq Exploration Program. These guidelines are based on the best available reclamation technologies.

## **1.2 Applicant Information**

### **1.2.1 Corporation Office Completing Application**

Name: Leslie Olmstead  
Manager: US Lands and Assets  
Telephone: (509) 326-4567  
Date: February 2022

### **1.2.2 Designated Contact Person**

Name: Leslie Olmstead  
Manager: US Lands and Assets  
Telephone: (509) 326-4567

### **1.2.3 Corporate Information**

Business Name: Teck American Incorporated  
Address: 501 Riverpoint Blvd., Suite 300  
Spokane, Washington 99202  
Telephone: (509) 747-6111  
President: Shezhad Bharmal  
Treasurer: Tammy Nelson  
Secretary/Vice President: Trevor Hall

### **1.2.4 Alaska Registered Agent**

Name: C T Corporation Service Company  
Address: 9360 Glacier Highway, Suite 202  
Juneau, AK 99801

## **1.3 Alaska Reclamation Requirements**

Reclamation of the proposed Phase I Anarraaq and Aktigiruuq Exploration project falls under the jurisdiction of the Alaska Department of Natural Resources (ADNR), Division of Mining, Land and Water (DMLW), Mining Section.

Alaska Statute (AS) 27.19, the Reclamation Act, applies to State, federal, municipal, and private land and water subject to mining operations. This statute is administered by ADNR. The Reclamation Act states that "a mining operation shall be conducted in a manner that prevents unnecessary and undue degradation of land and water resources and the mining operation shall be reclaimed as contemporaneously as practicable with the mining operation to leave the site in a stable condition" that allows for the reestablishment of renewable resources on the site within a reasonable period by natural processes. Alaska Administrative Code 11 AAC 97.240 further

states “a miner shall reclaim a mined area that has potential to generate acid rock drainage (acid mine drainage) in a manner that prevents the generation of acid rock drainage or prevents the offsite discharge of acid rock drainage.”

An approved reclamation plan is required by the State mining regulations 11 AAC 97.300 – 97.350. Pursuant to 11 AAC 97.310(a), miners must submit a proposed reclamation plan that is correct and complete to the best of the miner’s knowledge and has been signed and dated by the miner or the miner’s designee prior to starting mining operations. The reclamation plan does not become effective until a performance (reclamation) bond is in place. The performance bond amount shall be set at a level not more than an amount reasonably necessary to ensure the faithful performance of the requirements of the reclamation plan. 11 AAC 97 applies to the approval of reclamation plans, reclamation bonding, and the enforcement of reclamation requirements under AS 27.19 for locatable mineral, leasable mineral, and material mining operations on State, federal, municipal, and private land.

Reclamation performance standards are regulated under 11 AAC 97.200-250. The performance standards that are relevant to this project (because of the limited project scope) and addressed in this Reclamation Plan include 11 AAC 97.200, 97.210, 97.240, and 97.250. These regulations address land reclamation performance standards, disposal of buildings structures and debris on State, federal, and private land, acid rock generation, and reclamation of material sites. The reclamation activities described in this Plan will meet the requirements of these regulations.

## **1.4 Scope of Reclamation Plan**

This Reclamation Plan is specific to the activities associated with reclaiming roads (access and secondary access), surface pads (e.g., laydown pads, camp and portal pads, and vent-raise pads), material sites and bridges constructed during Phase I of the Anarraaq and Aktigiruaq Exploration Program. The general location and components of the Project are shown in Figure 1. This Plan describes the activities required to reclaim all components of the proposed Phase I Project and provides a cost estimate for completing these reclamation activities.

Section 2 of this Plan begins with a brief description of the proposed exploration project and the associated surface components that will be constructed in Phase I of the Project.



Table 1. Applicable State of Alaska Mine Reclamation Requirements

<p>“... reclaim areas disturbed by a mining operation so that any surface that will not have a stream flowing over it is left in a stable condition” that “allows for the reestablishment of renewable resources on the site within a reasonable period of time by natural processes.” Reclamation to a stable condition entails the:</p> <ul style="list-style-type: none"> <li>• “return of waterborne soil erosion to pre-mining levels within one year after the reclamation is completed, and that can reasonably be expected to achieve revegetation, where feasible, within five years after the reclamation is completed, without the need for fertilization or reseeding;</li> <li>• segregation of topsoil removed during the mining operation to protect it from erosion, protect it from contamination by acidic or toxic materials, and preserve it in a condition suitable for later use; and</li> <li>• promotion of natural revegetation wherever possible, including redistribution of topsoil where available”</li> </ul>	<p>11 AAC 97.200(a)  11 AAC 97.200(a)(1)  11 AAC 97.200(a)(2)  11 AAC 97.200(a)(3)</p>
<p>“reclaim an area disturbed by a mining operation so that surface contours after reclamation are conducive to natural revegetation or are consistent with an alternate postmining land use”</p>	<p>11 AAC 97.200 (b)</p>
<p>“re-establish any stream channel, that was diverted or modified and is no longer stable, in a stable location”</p>	<p>11 AAC 97.200 (d)</p>
<p>“remove, dismantle, or otherwise properly dispose of buildings and structures constructed, used, or improved on state land and remove or otherwise properly dispose of all scrap iron, equipment, tools, piping, hardware, chemicals, fuels, waste, or general construction debris on state land”</p>	<p>11 AAC 97.210</p>
<p>“... reclaim a mined area that has potential to generate acid rock drainage (acid mine drainage) in a manner that prevents the generation of acid rock drainage or prevents the offsite discharge of acid rock drainage”</p>	<p>11 AAC 97.240</p>
<p>“reclaim material sites in accordance with AS 27.19.020, 11 AAC 97.200, 11 AAC 97.210, and 11 AAC 97.250 as contemporaneously as practicable with mining.” The following apply for material site reclamation:</p> <ul style="list-style-type: none"> <li>• “If site conditions permit, a miner shall proceed cell by cell so that reclamation can and will occur immediately after each cell is mined. Mining by cell means dividing the material site into separate units and mining them in an orderly sequence so that topsoil removed from a newly opened unit can be placed on a unit already mined.</li> <li>• If site conditions require that the entire material site be mined continuously, with the materials being removed layer by layer, the site shall be reclaimed as soon as the mining is completed.</li> </ul>	<p>11 AAC 97.250(a)  11 AAC 97.250(a)(1)  11 AAC 97.250(a)(2)</p>
<p>“...Post a performance bond with the commissioner to ensure complete compliance with AS 27.19, this chapter and the approved reclamation plan, consisting of either:</p> <ul style="list-style-type: none"> <li>• a corporate surety bond under 11 AAC 97.405; or</li> <li>• a personal bond accompanied by a letter of credit, by a certificate of deposit, or by a deposit of cash or gold, under 11 AAC 97.410”</li> </ul>	<p>11 AAC 97.400(2)  11 AAC 97.400(2)(A)  11 AAC 97.400(2)(B)</p>

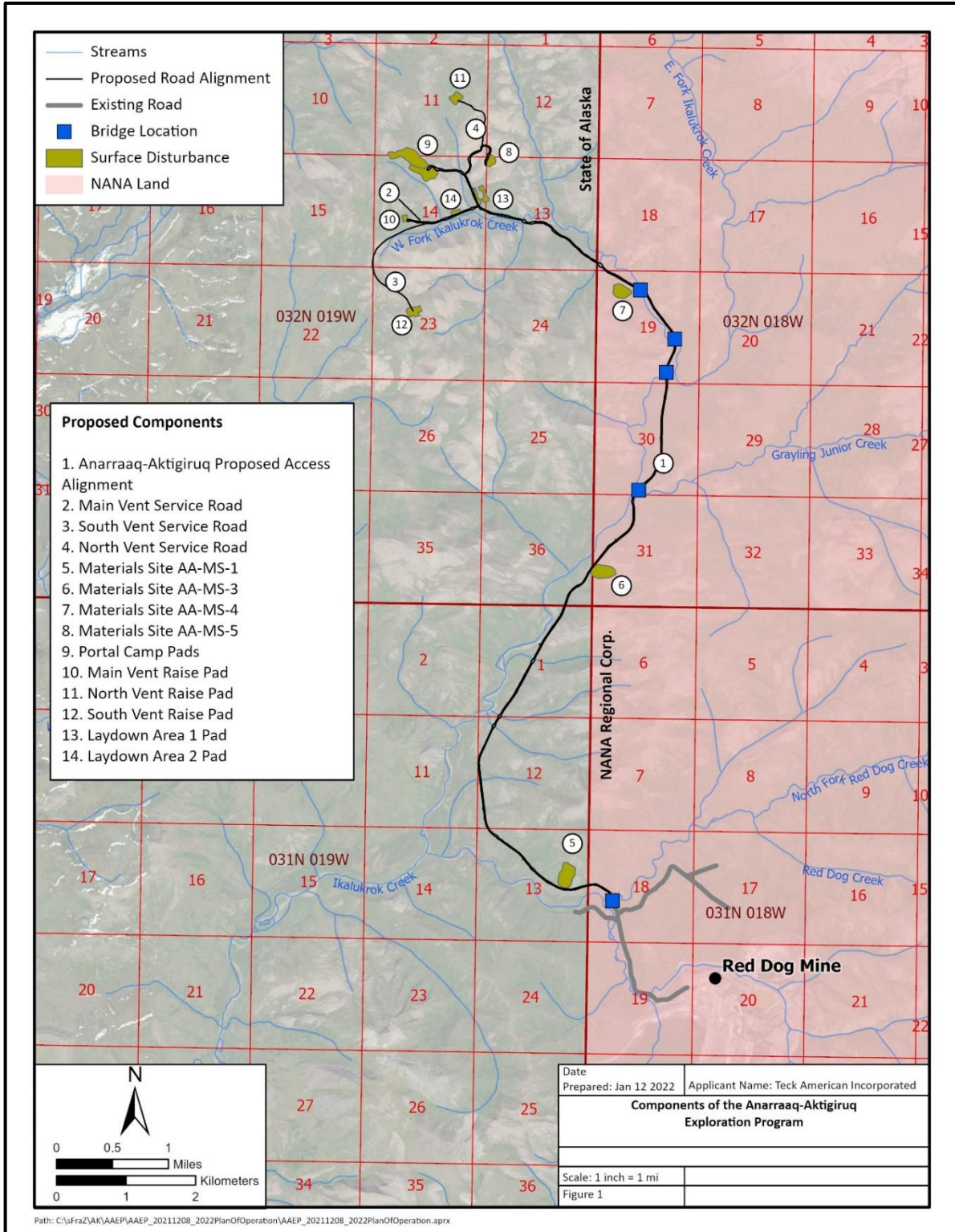


Figure 1. Components of the Anarraaq and Aktigirūq Exploration Program Included in this Reclamation Plan

Section 2 also describes the location and land status of the property and the current and proposed access to the site. This section also describes the components and associated surface disturbance in more detail and provides a sequence and schedule for all proposed construction activities.

Section 3 describes the reclamation methods, equipment, and schedule for the removal and reclamation of the access road, secondary roads, surface pads, material sites and bridges, revegetation and topsoil measures, as well as the post-reclamation monitoring that will be conducted by TAI.

Section 4 describes reclamation costs and bonding.

Drawings of the reclamation along the road corridors are included in the SRCE Excel file.

The “Basis of the Reclamation Cost Estimate for the Anarraaq and Aktigirug Exploration Program” that summarizes and discusses the sources, assumptions, and basis for deriving these costs is included in Appendix I to this Reclamation Plan.

## **2 PROJECT COMPONENTS & OPERATIONS**

### **2.1 Project Description**

Teck American Incorporated (TAI) is proposing the development of a two-phase exploration program to evaluate the economic and technical feasibility of mining lead-zinc resources identified near upper Ikalukrok Creek and the Red Dog Mine (RDM) in northwest Alaska, known as the Anarraaq and Aktigirug prospects (See Figure 1). In Phase I TAI will construct the main access road, surface pads, secondary roads to access the surface pads, four material sites, and five bridges over major stream crossings. Phase II will include the construction of surface and underground facilities and other regulated activities associated with the underground exploration program. Phase I is described in more detail in the Plan of Operations Anarraaq and Aktigirug Exploration Program Phase I – Exploration Access Road and Surface Pad Construction, to which this Reclamation Plan is appended. This Reclamation Plan is limited to describing the reclamation of all components of the Phase I program should the project not proceed to Phase II for some reason.

### **2.2 Location, Land Status, and Property Description**

The exploration property is situated in portions of four townships including Township 31-32 North, Range 18-19 West (T31N, R18W; T31N, R19W; T32N, R18W; and T32N, R19W), Kateel River Meridian (Figure 1). There is currently no existing overland access to the exploration area. TAI proposes constructing a single lane exploration access road. The exploration access road for the Project will begin near the terminus of the existing Fish Weir Road below the tailings facility at the Red Dog Mine and extends in a northerly direction for approximately 9.3 miles along Ikalukrok

Creek and the West Fork Ikalukrok Creek to the proposed Aktigiruaq and Anarraaq exploration area (See Figure 1). The access road route crosses State land where TAI owns State mining claims (Table 2), but also includes two segments that cross NANA land in T31 and 32N, R18W (Figure 1). NANA will provide written authority to construct the exploration access road segments on their land under a separate agreement between TAI and NANA.

Table 2. Mining Claims included in this Plan

ADL No.	Claim Name	Location Date	Map Reference MTRS Quarter Section
725339	AQ 1021	07/Sep/2017	Kateel River, 32N 19W, 11, SW
725340	AQ 1022	07/Sep/2017	Kateel River, 32N 19W, 11, SE
725341	AQ 1023	07/Sep/2017	Kateel River, 32N 19W, 12, SW
725343	AQ 1025	07/Sep/2017	Kateel River, 32N 19W, 13, NE
725344	AQ 1026	07/Sep/2017	Kateel River, 32N 19W, 13, NW
725345	AQ 1027	07/Sep/2017	Kateel River, 32N 19W, 14, NE
725346	AQ 1028	07/Sep/2017	Kateel River, 32N 19W, 14, NW
725350	AQ1032	07/Sep/2017	Kateel River, 32N 19W, 15, SE
725351	AQ 1033	07/Sep/2017	Kateel River, 32N 19W, 14, SW
725352	AQ 1034	07/Sep/2017	Kateel River, 32N 19W, 14, SE
725353	AQ 1035	07/Sep/2017	Kateel River, 32N 19W, 13, SW
725354	AQ 1036	07/Sep/2017	Kateel River, 32N 19W, 13, SE
725355	AQ 1037	07/Sep/2017	Kateel River, 32N 19W, 24, NE
725358	AQ 1040	07/Sep/2017	Kateel River, 32N 19W, 23, NW
725359	AQ 1041	07/Sep/2017	Kateel River, 32N 19W, 22, NE
725390	AQ 1072	07/Sep/2017	Kateel River, 32N 19W, 36, SE
725391	AQ 1073	07/Sep/2017	Kateel River, 31N 19W, 1, NE
725392	AQ 1074	07/Sep/2017	Kateel River, 31N 19W, 1, NW
725401	AQ 1083	07/Sep/2017	Kateel River, 31N 19W, 1, SW
725402	AQ 1084	07/Sep/2017	Kateel River, 31N 19W, 1, SE
725404	AQ 1086	07/Sep/2017	Kateel River, 31N 19W, 12, NW
725405	AQ 1087	07/Sep/2017	Kateel River, 31N 19W, 11, NE
725412	AQ 1094	07/Sep/2017	Kateel River, 31N 19W, 11, SE
725413	AQ 1095	07/Sep/2017	Kateel River, 31N 19W, 12, SW
725415	AQ 1097	07/Sep/2017	Kateel River, 31N 19W, 13, NE
725416	AQ 1098	07/Sep/2017	Kateel River, 31N 19W, 13, NW
725417	AQ 1099	07/Sep/2017	Kateel River, 31N 19W, 14, NE
725425	AQ 1107	07/Sep/2017	Kateel River, 31N 19W, 13, SW
725426	AQ 1108	07/Sep/2017	Kateel River, 31N 19W, 13, SE

The Project area is generally low mountainous terrain with taiga and tundra type biomass, interstitial to rocky outcroppings and talus slopes. Existing soils found within the project disturbance limit include alluvial, colluvial, organic rich (wetland soils), and rock outcroppings (Golder, 2017). Vegetation generally consists of willow, dwarf birch, alder, and other lowland type grasses, lichens, and mosses. Growth media/topsoil is very limited in depth and occurrence and generally only found near the lower slopes. Ephemeral and perennial streams are present throughout the course of the road alignment and exploration project site.

The project is in a Sub-Arctic environment underlain by permafrost. Precipitation in the region is generally low, ranging from 12-15 inches per year including rain and snowfall (HDR, 2017).

Major stream courses found within the project vicinity include Red Dog Creek, Ikalukrok Creek, and East and West Fork of Ikalukrok Creek. Ikalukrok Creek is a major tributary to the Wulik River, converging approximately 30 miles to the southwest. Six major stream crossings are included in the proposed access road design. To avoid or minimize detrimental effects on fish and fish habitat and WOTUS, TAI will install five steel span, truss-supported, bridges where the exploration access road crosses large streams and one stacked culvert crossing. In addition to the bridges, drainage is conveyed in strategically placed corrugated metal pipe (CMP) culverts installed at minor stream crossings and in areas where drainage will be impeded by the road construction.

## **2.3 Proposed Project Components and Construction**

As described in TAI's Phase I Plan of Operations for this Project, Phase I will entail the following:

- Constructing ~9.3 miles of exploration access road starting from the Fish Weir Road at the Red Dog Mine and extending along Ikalukrok Creek to the proposed portal pad site.
- Constructing ~3.1 miles of secondary roads to connect the proposed exploration access road to proposed surface pads described below.
- Constructing surface pads (including a camp pad, a portal pad, three vent-raise pads, and two laydown pads).
- Developing two material sites (including blasting and crushing) on TAI owned and operated State mining claims to provide sufficient material for road and surface pad construction, and  
Reclamation, including a reclamation cost estimate for the reclamation of the access road, secondary roads, surface pads, and material sites on State mining claims and NANA land.

For simplicity, project components are broken into three major categories in this Reclamation Plan: 1) the access and secondary roads, 2) the surface pad for laydown areas, camp and portal, and vent-raises, and 3) material sites and discussed in the next subsections. The surface disturbance acreages associated with each component of the proposed project are summarized in Table 3.

Best Management Practices (BMPs) will be implemented to reduce erosion and sedimentation of disturbed areas during construction, operation, and reclamation activities.

Table 3. Phase I Construction Disturbance Summary

Facility Type	Disturbance Area (Acres)**
Access and Secondary Roads	116.1
Material Sites	44.2
Surface Pads	53.1
<b>Total Disturbance</b>	<b>213.4</b>

\*\*Values are derived from areas calculated from KUNA and SRK design drawings

### 2.3.1 Exploration Access Road and Secondary Roads

An approximate 9.3-mile access road is required to connect RDM to the proposed Anarraaq and Aktigirug exploration area. In addition, approximately 3.1 miles of secondary roads are required to access various pads.

All roads are intended to be temporary. The design parameters will support construction traffic and anticipated daily exploration traffic. The design anticipates subsidence of underlying soils along the roadway, requiring maintenance throughout the summer season as the active layer thaws.

Much of the roadway will be constructed as a fill embankment; however, some areas are designed with cut-to-fill or full cut sections (Kuna, 2022). Depth of fill is contingent upon underlying soil stability and grade requirements. Depths of fill range between one (1) foot minimum to ten or more (10+) feet near stream crossings. Depths of cuts range from one (1) to more than twenty (20+) feet in areas of cut along the roadway and borrow areas. Growth media may be found in limited usable quantities and where practical it may be separated and stockpiled for future reuse during reclamation, although vegetation and root mass in this alpine environment is quite minimal.

Six major stream crossings are included in the proposed access road design. To avoid or minimize detrimental effects on fish and fish habitat, TAI will install five steel span, truss-supported, bridges where the exploration access road crosses large streams, including the first three crossings (Red Dog Creek, Grayling Jr. Creek, and the first Ikalukrok Creek crossing) where the streams are known to support Arctic Grayling and Arctic Char. The West Fork Ikalukrok Creek crossing near the exploration facilities area, will be constructed using fill and large diameter culverts. In addition to the bridges, drainage is conveyed in strategically placed corrugated metal pipe (CMP) culverts installed at minor stream crossings and in areas where drainage will otherwise be impeded by the

road. This reclamation plan incorporates reclamation for the main access road and secondary roads.

### **2.3.2 Surface Pads for Laydown Areas, Camp and Portal, and Vent-Raises**

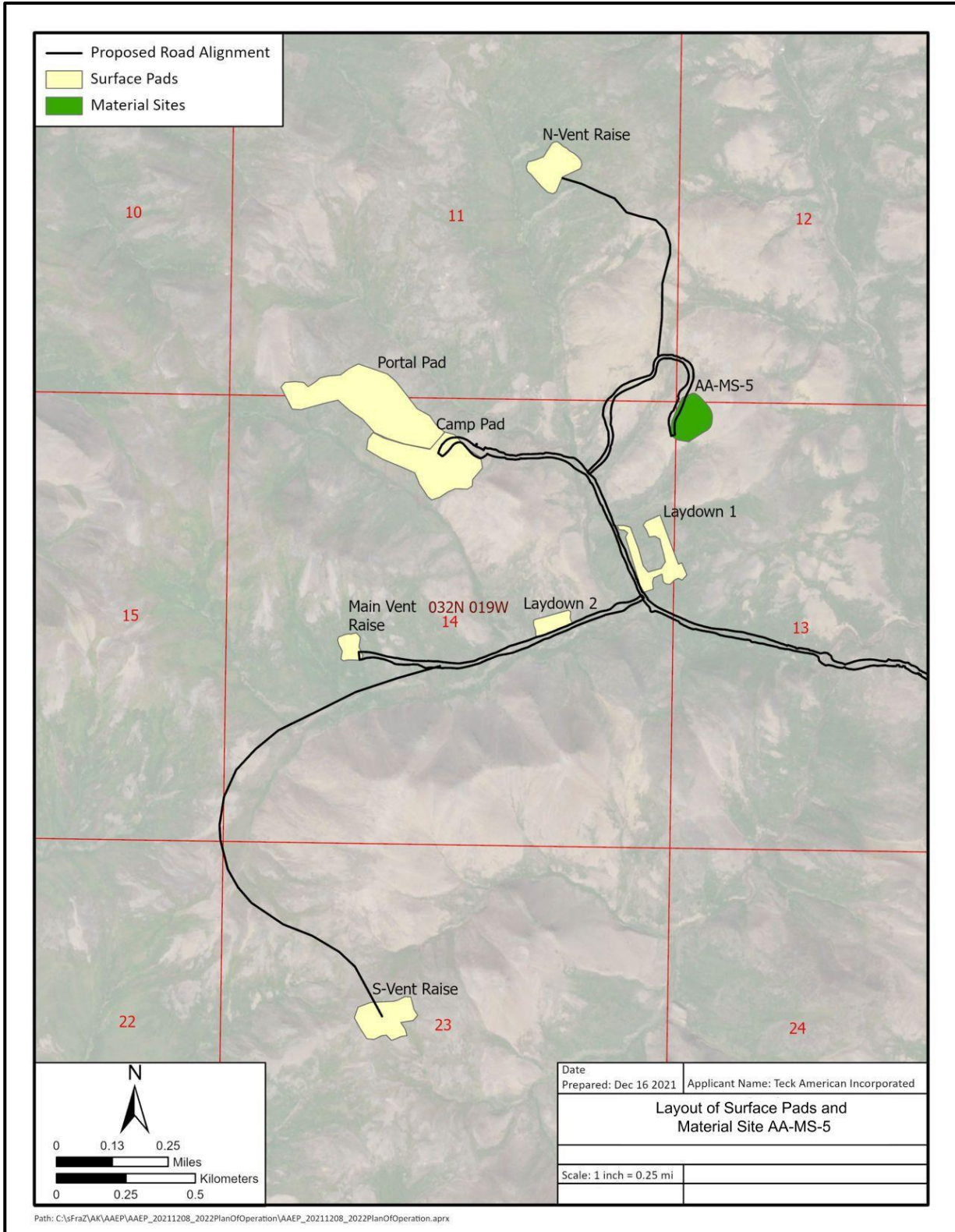
Phase I construction includes development of seven surface pads including: two laydown pads, three vent-raise pads, the camp pad, and the portal pad. This Reclamation Plan addresses reclamation of these pads. Figure 2 illustrates the general arrangement of the proposed portal and camp pads, vent-raise pads, laydown areas and material site AA-MS-5. Cut and fill construction methods will be employed to construct these pads, or as required, using material sourced from the cut or one of the material sites. All surface pads are connected to the exploration access road by secondary roads. The portal pad, camp pad, vent-raise pads, and laydown pads will consist of at least 3 feet of general embankment fill from the material sites, capped with material suitable to create a driving surface. These pads will be constructed on uplands, where settling and thermal instability is not a concern. This reclamation plan incorporates reclamation of the surface pads.

### **2.3.3 Material Sites**

Four material sites will be developed to supply material for construction of the access road, secondary roads, and surface pads. In addition, fill material may be sourced from cut areas at the pads and along the roads. The material sites are all on uplands and the material consists of variably weathered shale, chert, quartzite, limestone, and/or limey sandstone. Material will be blasted, excavated, and some will be passed through a stationary grizzly before being hauled for use in road and pad construction. Some material will also be processed through a crusher. Any potentially acid generating (PAG) material that is excavated will be managed in accordance with TAI's approved Construction Rock Handling Plan. Material sites AA-MS-1 and AA-MS-5 are on state land while AA-MS-3 and AA-MS-4 are on NANA land. This reclamation plan incorporates reclamation of all four material sites.

## **2.4 Construction Sequence and Schedule**

Construction of the access road is discussed in more detail in the Phase I Plan of Operations. Construction of the exploration access road is anticipated to begin in the winter (January) of 2023 and construction of secondary roads and surface pads will likely extend through 2023.



**Figure 2. General Arrangement of the Portal and Camp Pads, Vent-Raise Pads, Laydown Pads, and Material Site AA-MS-5**



### **3 RECLAMATION METHODS & SCHEDULE**

TAI is committed to protecting the environment and the people living near the Anarraaq and Aktigiruaq Exploration Program area. TAI's reclamation goals in relation to the Phase I Project are to recontour, revegetate, or otherwise stabilize all areas impacted by exploration activities so lands are left in a stable condition that supports the reestablishment of renewable resources within a reasonable period. This would allow the lands to be returned to much the same use they are now. This section describes the reclamation activities that will be completed for the access road, secondary roads, surface pads, and material sites described in Section 2.

In this section, reclamation is divided into three stages:

1. Stage I: Removal of any temporary facilities, equipment, and refuse.
2. Stage II: Reclamation of the access road and secondary roads, surface pads, and material sites and removal of bridges.
3. Stage III: Post-reclamation monitoring.

As previously described TAI is proposing to construct the infrastructure and support facilities for the Anarraaq and Aktigiruaq Exploration Program in two phases. This Reclamation Plan describes reclamation activities that would be implemented in the unlikely situation where TAI decided not to proceed with Phase II of the Project. As result it is not possible to discuss a schedule (absolute date) for Phase I reclamation as it will likely be superseded by the Phase II Reclamation Plan within this year. Nonetheless, it is possible to discuss the duration and sequencing of Phase I reclamation if it was to be implemented. In this Reclamation Plan and the accompanying SRCE cost estimate TAI assumes that all Phase I reclamation activities will be performed in a single construction season with complete mobilization of equipment taking place in early summer and demobilization taking place in the late fall. Details of each of the three stages of reclamation are provided in the subsections below.

#### **3.1 Stage I: Removal of Temporary Surface Facilities, Fuel, Equipment, and Refuse**

During construction, one or more contractors may place modular offices, Conex containers, fuel storage tanks, or other equipment on the site or along the access road to support construction activities. During the initial phase of reclamation, the pads will be cleared of these facilities, equipment, tanks, refuse, etc., to allow the initiation of reclamation of these pads (Stage II). It may be necessary to leave some facilities and equipment in place to support reclamation, but all will be removed prior to that site being regraded and reseeded.

Though none are expected, any fuel-contaminated soils or gravels will be treated in a manner developed and approved in collaboration with the ADEC.

### 3.2 Stage II: Reclamation of the Access Road, Secondary Roads, Surface Pads, and Material Sites

In this subsection the reclamation activities associated with road, bridge and pad removal are discussed. Typical equipment required for this work is listed in Table 4. The cost estimate assumes that all equipment will have to be mobilized to the site in advance of performing the reclamation work described here. Other equipment may be substituted for, or included with, the above equipment list. Equipment needs and uses during reclamation would remain dynamic, as specific conditions require.

Table 4. Typical Reclamation Heavy Equipment List

Three Caterpillar bulldozers (D7E, D9T, and D11T)
One Caterpillar motor grader (16M3)
Three Caterpillar track excavators (325F, 330F, and 349F)
Four LeTourneau wheeled loaders (930M, 966M, 988K, and 992K)
Caterpillar H120Es and H160Es hydraulic hammers
Caterpillar S3050 and S3070 demolition shears
Caterpillar G315B and G320B demolition grapples
Caterpillar 740C and 776G dump trucks
Caterpillar 613E (5,000 gal) water truck
Caterpillar 621E (8,000 gal) water truck
Caterpillar 777D water truck
20-ton crane
Hydroseeder

#### 3.2.1 Access Road

The access road surface will be ripped or scarified, as necessary, to eliminate the effects of compaction, and recontoured to blend with the original topography and provide for positive drainage and promote natural revegetation. The recontoured road surface will be covered with growth media (if available) and re-seeded using the species listed in Tables 5 and 6. In areas where road fill may impound water, the berms and embankment may be removed to facilitate drainage. The reclaimed road will be stabilized to ensure the area will retain sufficient moisture for natural revegetation. In addition, any disturbance caused by thawing permafrost adjacent to the road embankment will be filled to prevent further degradation of underlying soils to the extent practicable for stabilization. Efforts will be made to identify any areas of thermal instability as they develop during construction so they can be mitigated as soon as practical in advance of reclamation activities.

Pull-outs along the entire road alignment and other cleared areas will be reclaimed in a manner like the access road and be ripped or scarified and recontoured as needed for drainage, covered with growth media (if available), and seeded following final equipment removal.

Bridges and abutments will be removed and salvaged. Abutment construction materials such as concrete and exposed geotextile fabric will be removed and disposed of properly. Culverts will be removed and salvaged or disposed of properly off site. Any stream channels that were diverted will be re-established in a stable location. Disturbed areas will be ripped or scarified, recontoured, and seeded as necessary following removal of all appurtenances.

Any geotextile fabric exposed during reclamation grading will be excavated back two feet from the surface, cut and disposed of at an approved landfill location.

Figure 3 illustrates proposed reclamation details for the access road while Figure 4 illustrates the proposed details for bridge and culvert reclamation.

### **3.2.2 Secondary Roads**

Secondary roads leading to or from reclaimed pads will be ripped or scarified, as necessary, to eliminate the effects of compaction, and recontoured as needed to blend with the original topography and provide for positive drainage and promote natural revegetation. Fill material used for construction of the roads will be removed and placed on the uphill side filling in drainage ditches. The embankments will be graded to prevent ponding of water and re-establish drainage patterns. The recontoured road surface will be covered with growth media (if available) and reseeded using the species listed in Tables 5 and 6. The reclaimed roads will be stabilized to ensure the area will retain sufficient moisture for natural revegetation. BMPs will be maintained and installed as necessary to control erosion and runoff, removal of all culverts and ripping or scarifying the surface prior to reseeding.

Any geotextile fabric exposed during reclamation grading will be excavated back two feet from the surface, cut and disposed of at an approved landfill location.

### **3.2.3 Surface Pads**

The surface pads for the vent-raises, portal and camp, and two laydown areas will be graded to discourage ponding of surface water. Any highwall cut faces will be stabilized and left in place. Fill embankments will be reclaimed by pulling the outer crest of the fill over the pad to the highwall, grading to control surface water, and blending with the local topography as much as possible. The recontoured surfaces will be ripped or scarified where compacted, covered with stockpiled growth media (if available), and seeded.

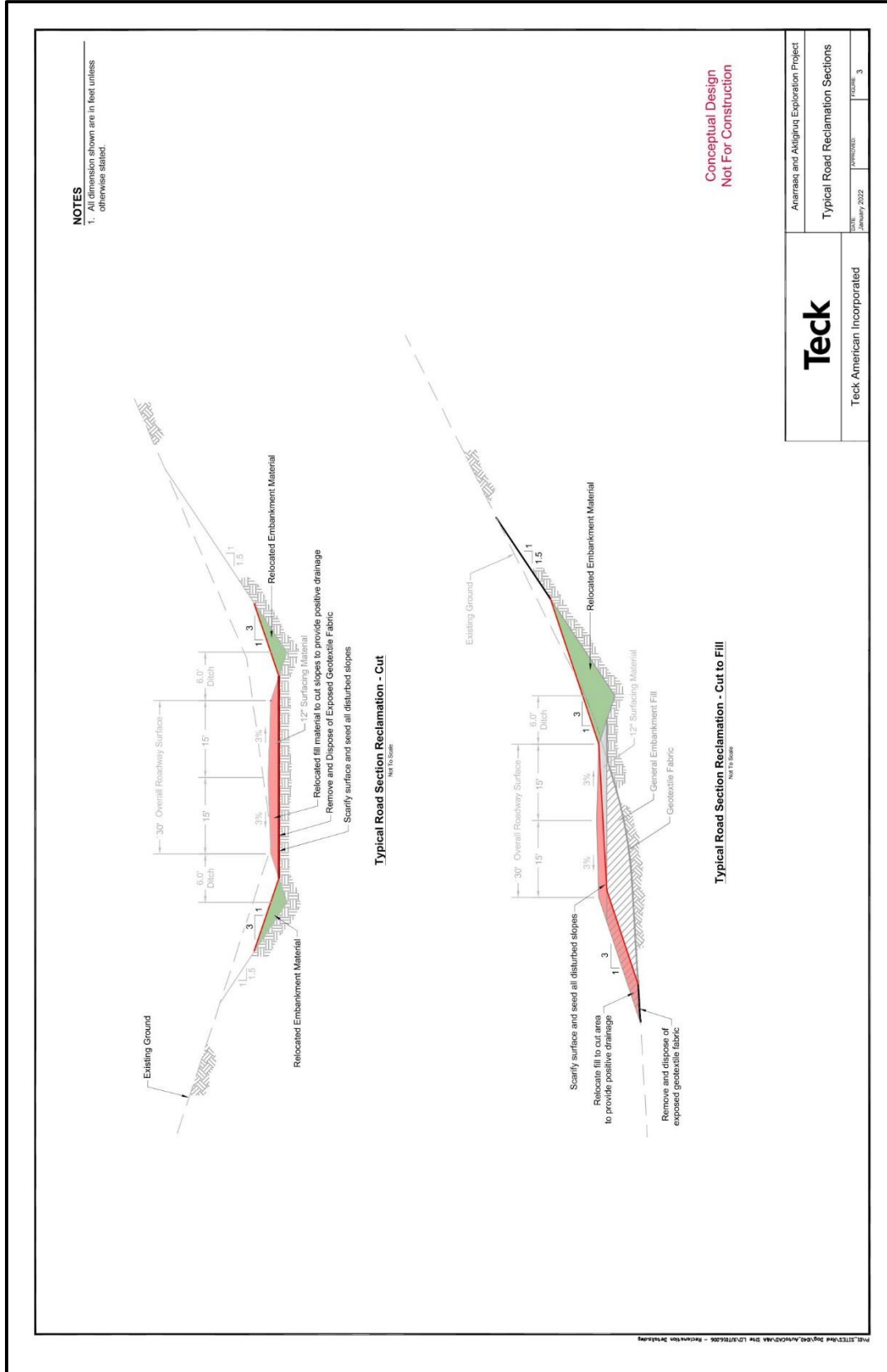


Figure 3. Typical Road Reclamation Sections

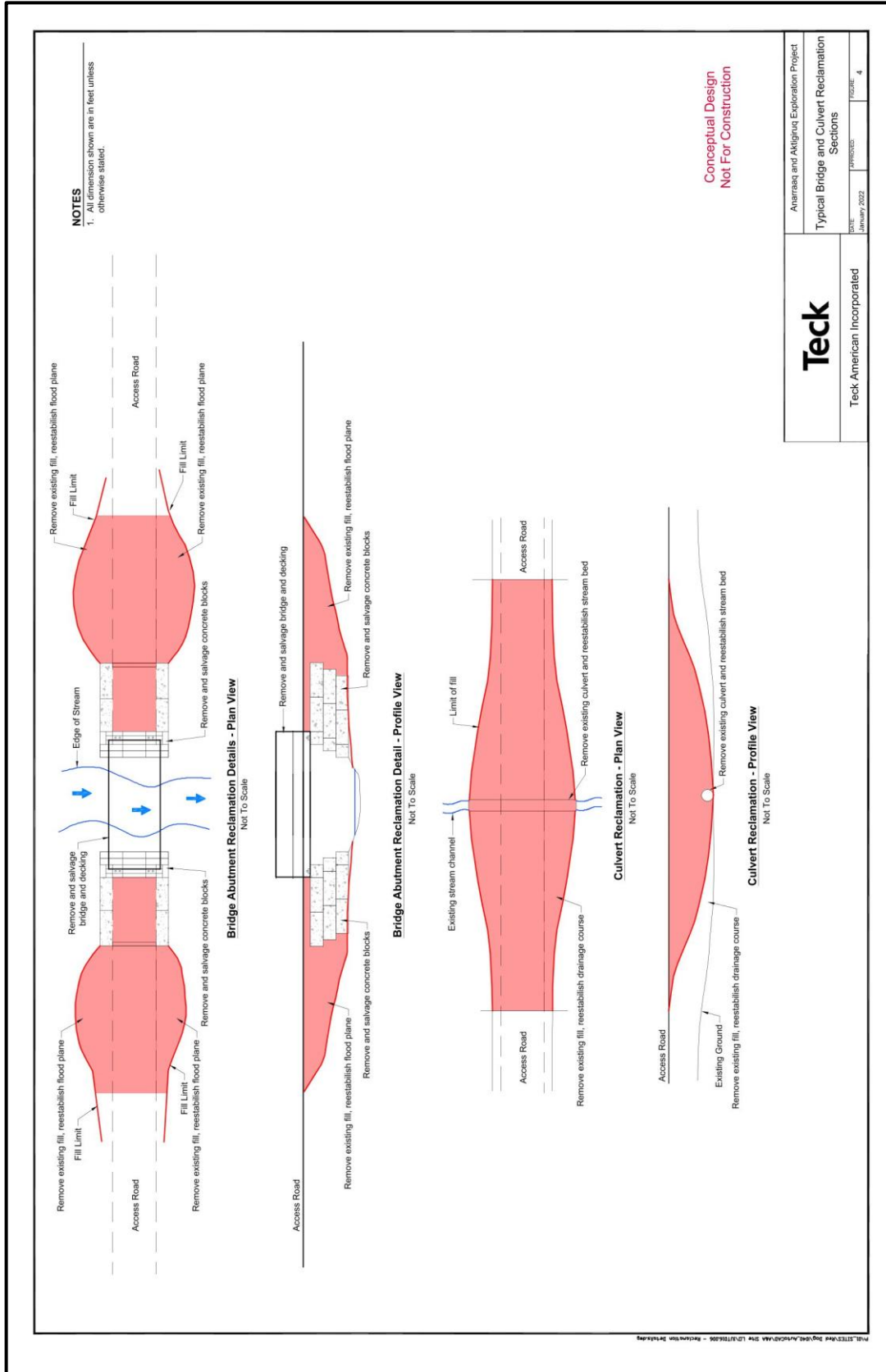


Figure 4. Typical Bridge and Culvert Reclamation Sections

### **3.2.4 Material Sites**

Four material sites are located along the access road alignment. See Figure 1 for general location. All material sites will be reclaimed when no longer needed for closure materials. The highwall cut faces will remain at developed cut slope angles and left in place. A safety berm consisting of large boulders, or an earthen embankment will be placed along the crest of the highwalls for public safety. Fill embankments will be reclaimed by pulling the outer crest of the fill over the pad to the highwall, grading to control surface water runoff to free drain out of the pits will be established, blending with the local topography as much as practical. The recontoured surfaces will be ripped where compacted, bedrock will be covered with suitable soils conducive to plant recolonization, covered with stockpiled growth media (if available), and seeded. The material sites were selected on the basis of geochemical data that indicate they are likely comprised of non-PAG material. However, at the initial development of each of the material sites, and at any time when mineralized material is identified in a site, TAI will characterize the material as PAG or non-PAG in accordance with the Construction Rock Handling Plan (Handling Plan) approved by ADEC. If significant PAG is identified the site will likely be abandoned and eventually reclaimed. There is no scenario where TAI will develop a site that results in a PAG highwall. Any small volumes of PAG that are excavated to access non-PAG material will be removed to temporary storage at AA-MS-1 in accordance with the approved Handling Plan. Figure 5 illustrates the details proposed for material site reclamation.

### **3.2.5 Revegetation**

Disturbed ground will be seeded to encourage an initial vegetative cover to provide stability while native recruitment eventually establishes a longer-term stable cover of native vegetation. For the initial revegetation, the seed mixture recommended for use in the Red Dog Mine Reclamation and Closure Plan (Teck Alaska Incorporated, 2021), will be used for the Anarraaq and Aktigiruaq reclamation work. Field trials at RDM have identified plant species for reclamation of specific disturbance-types as outlined in Table 5. The table outlines the native grass cultivars and native forbs appropriate for the reclamation of roads, pads, and quarries and the shrub cuttings and seedlings appropriate for the reclamation of stream banks and other wet areas. Recommended native grass cultivars and forbs are described in Table 6.

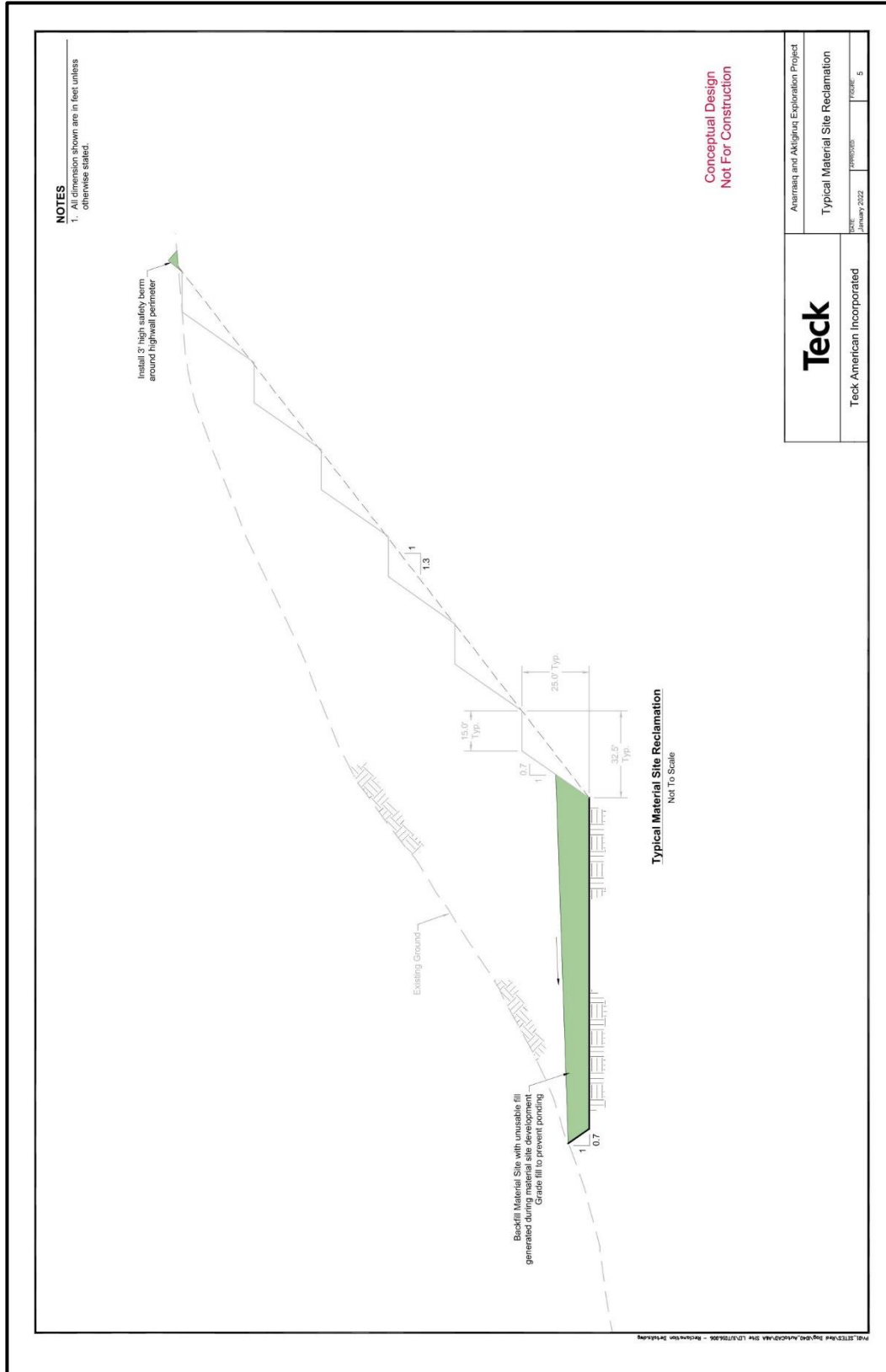


Figure 5. Typical Material Site Reclamation

Table 5. Revegetation Recommendations for Infrastructure Areas

Area	Plant Species	Planting Specifications
Reclaim roads, laydown areas, pads and quarries	Native grass cultivars Native forbs	(See Table 6) (See Table 6)
Banks of streams and other wet areas	Shrub cuttings and seedlings Diamond leaf willow Felt leaf willow Richardson willows Shrub/dwarf birch	Cuttings on one-foot centers Cuttings on one-foot centers Cuttings on one-foot centers 80 seeds/yd <sup>2</sup>

Table 6. Proposed Revegetation Species

Plant Species	Planting Specifications
<u>Native-grass cultivars</u> Boreal red fescue <i>Festuca rubra</i> Glaucous tundra bluegrass <i>Poa glauca</i> Gruening alpine bluegrass <i>Poa alpina</i> Nortran tufted hairgrass <i>Deschampsia caespitosa</i> Reed bluejoint <i>Calamagrostis canadensis</i> Wainwright (“slender”) wheatgrass <i>Elymus trachycaulus</i>	Apply seed at 20 lb/acre (final mixture). Ratio of species will depend on availability but may include predominantly P. alpina for drier areas and D. caespitosa, E. trachycaulus, and C. canadensis for mesic sites.
<u>Native forbs</u> Alpine sweetvetch (masu) <i>Hedysarum alpinum</i> Dwarf fireweed <i>Chamerion latifolium</i> Indian milkvetch <i>Astragalus aboriginum</i> Low-lying stinkweed <i>Artemisia arctica</i>	Apply forb seed at 5% of total seed rate in equal parts per species or as available. E.g., if grass seed rate is 20 lb/acre, apply grass at 19 lb/acre and forbs at 1 lb/acre. Mix may include A. alpinus, A. arcticus, E. sibirica, L. arctica, and O. campestris in drier/alpine areas, and A. millefolium, Chamerion spp, and H. alpinum in mesic areas.
<u>Other potential forb species</u> Alpine milkvetch <i>Astragalus alpinus</i> Arctic bladderpod <i>Lesquerella arctica</i> Boreal yarrow <i>Achillea millefolium borealis</i> Field oxytrope <i>Oxytropis campestris</i> Siberian aster <i>Eurybia sibirica</i> Tall fireweed <i>Chamerion angustifolium</i>	

As with any seed mix, a degree of flexibility is necessary depending on seed availability and site-specific conditions; and the mix may be modified. The seed mix may change over time depending on factors such as internal and external research, technologic advancements, changes in land



management approach, and commercial availability. The seed mixtures described in Tables 5 and 6 will be purchased commercially and augmented with some local forbs. Seed will be broadcast by hydroseeder, depending on the size and accessibility of areas to be treated. Alternatively, helicopter-seeding may be used to revegetate the whole site, but the cost estimate in Section 6 is based on the hydroseeder method. During revegetation, weed control practices would be implemented to limit the growth and spread of weeds and invasive species and promote the successful re-establishment of native plant species.

The timing of seeding considers the germination of the seed and its establishment. The preferred seeding time is in the spring, immediately following snowmelt and runoff when the soil surface is moist, and temperatures are warming. As a result, the reclamation cost estimate assumes helicopter reseeding in the spring season in the year following site reclamation.

### **3.2.6 Topsoil**

11 AAC 97.310(b)(6) includes a requirement for measures for topsoil removal, storage, protection, and replacement. The environment in the Anarraaq and Aktigiruaq Exploration Program area is sub-arctic. The entire area is understood to be underlain by permafrost to depths as great as 600 feet. Little soil development is possible under these conditions and most fine-grained soils are high in moisture and generally frozen. During construction of the Phase I roads and pads TAI anticipates that very little salvageable topsoil will be encountered, salvaged and stockpiled. Where thicker soils may exist, it is typically along stream valley bottoms where the soils are frozen with a high moisture content. Construction practice in these permafrost-rich environments is to disturb this soil as little as possible to maintain the existing soil insulating qualities and avoid destabilizing the underlying permafrost. Topsoil that TAI does salvage will be stored opportunistically in select areas, close to where it was removed, and saved for reclamation use.

## **3.3 Stage III: Post-Reclamation Monitoring**

By Stage III, all surface disturbances will be stabilized, and acceptable stormwater quality is anticipated. TAI will continue to manage stormwater during Stage I and II reclamation activities. Once Stage I and II reclamation activities are completed and in the absence of any surface instability in reclaimed areas, TAI will file a Notice of Termination (NOT) of the Stormwater Multi-Sector General Permit. Stormwater permit monitoring requirements will cease with the NOT. However, TAI will perform annual flyovers of all reclaimed areas to identify any reclaimed areas that appear to be exhibiting evidence of significant erosion or failure of the initial revegetation effort TAI will be prepared to reseed or hand-dress these areas to stabilize them. TAI anticipates performing the flyovers for the first five years following final reclamation and has included these costs and a contingency cost for addressing areas that require dressing or reseeding.

## **4 RECLAMATION COST ESTIMATE & RECLAMATION BONDING**

Proof of financial assurance to pay the cost for reclamation is referred to as a “bond” in this section. Reclamation costs, including direct and indirect costs, have been calculated based on the Reclamation Plan and using the Standard Reclamation Cost Estimator (SRCE). The bond amount would be equivalent to the estimated reclamation costs calculated in accordance with state financial assurance regulations and policy. The State and TAI will negotiate a final bond amount prior to the approval of the Phase I Plan of Operations and initiation of any construction activities. This is an iterative process focused on a review of the estimated reclamation costs in the SRCE model provided by TAI.

The SRCE model includes costs for reclamation of the access road, secondary roads, surface pads, material sites, and post-reclamation monitoring as previously described herein. Reclamation would be completed during the first full construction season following a decision to end exploration activities and reclaim the disturbed areas.

The SRCE model is based on third party implementation of this Reclamation Plan, no recycle or salvage costs recovery credits are included, and it assumes on-site disposal of all equipment and facilities except for hazardous waste, which would be shipped off-site to an appropriate hazardous waste disposal facility.

The “Basis for the SRCE Model” is included in Appendix I. This document summarizes the sources, assumptions, and basis for the unit costs, construction quantities, equipment fleet, and crew productivities and other costs. Drawings that support the SRCE model are included in Appendix II.

Table 7 Summarizes the estimated reclamation costs by major reclamation activity.

Table 7. Reclamation Cost Summary – SRCE Output

Activity		Total Cost (\$)
<b>Direct Costs</b>		
Access and Secondary Roads		\$945,038
Stormwater Management		120,880
Post-reclamation Monitoring		10,588
Material Sites		133,302
Waste Disposal		111,306
Surface Pads		368,337
Reclamation Maintenance		174,903
G & A		855,322
Equipment Idle Time		763,252
Mobilization/De-mobilization		710,598
<b>Direct Costs Subtotal</b>		<b>\$4,193,527</b>
<b>Indirect Costs</b>		
Engineering, Design, and Construction Plan (3%)		\$125,806
Contingency (10%)		419,353
Contractor OH and Profit (also includes Liability and Bonding) (14%)		587,094
Contract Administration (5%)		209,676
<b>Indirect Costs Subtotal</b>		<b>\$1,341,929</b>
<b>TOTAL RECLAMATION COST</b>		<b>\$5,535,456</b>

Source: ANQ\_ATK\_Exp\_Rd\_Rev\_2022\_SRCE\_V1 20220211

## 5 References

Golder Associates, 2017, Geotechnical Findings and Recommendations for Aktigiruaq Road Alignment, Red Dog, Alaska, December

HDR, 2017, Bridge Abutment Conceptual Design, Bridge Crossing Assessment, Red Dog Mine Exploration Road, December 20

Kuna Engineering, 2022, Aktigiruaq Exploration Access Road, Red Dog Mine Alaska, (Engineering Road Design Drawings).

Teck Alaska Incorporated, 2021, Reclamation Plan, Red Dog Mine, Alaska, USA. September 2021. Teck Alaska Report prepared for State of Alaska Approval, September 84p.

Appendix I – Basis of SRCE Cost Estimate

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Appendix II – Reclamation Plan Drawings for SRCE Model

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