



**ROCA HONDA MINE
Plan of Operations and
Mine Operations and Reclamation
Plan (PoO-MORP)**

Submitted to:
**New Mexico Mining and Minerals
Division Energy, Minerals and
Natural Resources Department
And U.S. Forest Service
(Cibola National Forest)**

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List of Acronyms

ACOE	Army Corps of Engineers
AERMOD	air dispersion modeling
AJD	Approved Jurisdictional Determination
ANFO	ammonium-nitrate fuel oil
BDR	baseline data report
BGEPA	Bald and Golden Eagle Protection Act
bgs	below ground surface
BMP	Best Management Practices
CaCl ₂	Chilled brine
CFR	Code of Federal Regulations
CGP	Construction General Permit
CNF	Cibola National Forest
CO	carbon monoxide
CO ₂	carbon dioxide
COC	constituents of concern
CWA	Clean Water Act
DF	drift-and-fill
DPM	diesel particulate matter
DRAs	Development Drill Areas
ECMP	Emergency and Crisis Management Plan
EIS	Environmental Impact Statement
Energy Fuels	Energy Fuels Resources Inc.
EPA	Environmental Protection Agency
EPM	Environmental Protection Measures
ERP	Emergency Response Plan
Fernandez	Fernandez Company, Ltd
FR	Forest Road
GMU	Game Management Unit
gpm	gallons per minute
HDPE	high density polyethylene
hp	horsepower
IEEE	Electrical and Electronic Engineers
kW	kilowatt
LHD	load/haul/dump
LRMP	Land and Resource Management Plan
LSA	Low Specific Activity
MAT	most appropriate technology

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MAT	most appropriate technology
MBTA	Migratory Bird Treaty Act
MCCs	Motor Control Centers
MMD	Mining and Mineral Division
MMF	multimedia filtration
MORP	Mine Operations Reclamation Plan
MSGP	Multi-Sector General Permit
MSHA	Mine Safety and Health Administration
MV	medium voltage
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NEC	National Electric Code
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFS	National Forest System
NM SHPO	New Mexico State Historic Preservation Office
NM	New Mexico
NMAC	New Mexico Mining Act
NMAC	New Mexico Administrative Code
NMAQB	New Mexico Air Quality Bureau
NMDGF	New Mexico Department of Game and Fish
NMDOT	New Mexico Department of Transportation
NMAQB	New Mexico Air Quality Bureau
NMED	New Mexico Environmental Department
NM-EMNRD	New Mexico Energy, Minerals and Natural Resources Department
NMMMD	New Mexico Mining and Mineral Division
NMOSE	New Mexico Office of the State Engineer
NMSLO	New Mexico State Land Office
NMSRCP	New Mexico State Register of Cultural Properties
NMWQB	New Mexico Water Quality Bureau
NORM	naturally occurring radioactive materials
NOx	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NSPS	New Source Performance Standards
NWP	Nationwide Permit
OSE	Office of State Engineer
PAP	Permit Application Package
pH	potential of Hydrogen
PLSS	Project Land Survey System
PMLU	Post Mining Land Use
PODs	Points of Diversion
PoO	Plan of Operations
Project	Roca Honda Mine Project
PVC	polyvinyl chloride

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RCB	Radiation Control Bureau
RCRA	Resource Conservation and Recovery Act
RHR	Roca Honda Resources, LLC
ROW	right of way
RSJ	Rio San Jose
SAR	sodium absorption ratio
SLO	State Land Office
sqft	Square foot
SPCC	Spill Prevention, Control, and Countermeasure Plan
SRP	step room-and-pillar
Survey Plan	Post Mine Radiological Surveys Plan
SWPPP	Stormwater Pollution Prevention Plan
TCP	Traditional Cultural Property
TDS	Total Dissolved Solids
TENORM	technologically enhanced naturally occurring radioactive materials
TSS	Total Suspended Solids
URI	Uranium Resource Incorporated
USACE	US Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
V	Volts
VRM	Visual Resource Management
WICP	Wildlife Impacts Contingency Plan
WL	working levels
WOTUS	Waters of the United States
WQB	Water Quality Bureau
WQBELs	water quality-based effluent limits
WTP	Water Treatment Plant

1.0 Executive Summary

This Plan of Operations and Mine Operations and Reclamation Plan (PoO-MORP) has been prepared in accordance with the New Mexico Administrative Code (NMAC) 19.10.6.602 D.15 regulations for new non-coal mining operations and is prepared to also meet the United States Forest Service (USFS) requirements for submittal of a Plan of Operations for mining on National Forest System (NFS) lands. The PoO-MORP is organized in conformance with the regulatory requirements outlined in NMAC Section 19.10.6.602.D.15 (a) through (k) and 19.10.6.603 A through H. Additional information and document sections conform to the regulatory requirements of 36 Code of Federal Regulations (CFR) 228 Subpart A.

2.0 Introduction

The Roca Honda Mine Project (Project) is wholly owned by Roca Honda Resources, LLC (RHR), a subsidiary of Energy Fuels Resources Inc. (Energy Fuels). It is located approximately three miles northwest of the community of San Mateo, New Mexico, and 22 miles by road northeast of Grants, New Mexico, in McKinley County. The Project area encompasses four sections of land, Sections 9, 10, 16, 17, as well as the disturbance areas associated with the existing forest service road in Section 11 and improving an existing forest road to use as a utility corridor in Section 15, and the mine water discharge pipeline leading into and out of the Project area. Surface and mineral land ownership within the Project area is shown in **Figure 1**. Energy Fuels holds access to mineral rights through fee access or located mineral claims. Anticipated surface facilities include haul and utility roads, ore bays, retention (holding) ponds, diversion channels, sanitary wastewater treatment facilities (septic systems), water treatment facilities, warehouse and storage areas for equipment, vehicles, chemicals and solutions, maintenance building, topsoil stockpiles, excavated materials stockpiles, parking areas, mine shafts, vent shafts and escape ways, hoist buildings and head frames, drill holes, dewatering wells and pipeline network, fences, power and water lines, surface water runoff control features, and a treated water discharge pipeline. The New Mexico Administrative Code (NMAC) requirements specify the various mine facilities that must be discussed. The Roca Honda mine will not have leach pads, heaps, pits, tailings disposal facilities, or mills. A summary of proposed facility footprints, additional grading area, and the total proposed disturbance acres is included in **Table 1**.

Table 1. Project Facilities and Disturbance Acres

Facility	Section	Facility Footprints (acres)	20% Additional for Grading (acres)	Total Disturbance (acres)
Haul Roads	17, 16	20.1	4.0	24.1
Developmental Drilling Areas	17,16,10, 9	73.9*	N/A	73.9
Utility Corridor Road	15	8.1	1.6	9.8
Maintenance Roads	17,16,15, 11,10, 9	7.2	1.4	8.7
Vent Shaft Road	17,16, 10,9	4.1	0.8	5.0
Vent Shaft Pads	17,16, 10, 9	5.2	1.0	6.3
Dewatering Well Pads	17,16, 10, 9	17.2	3.4	20.7
Dewatering Well Roads	17, 16, 10	12.2	2.4	14.7
Stockpile Pads	17, 16	58.4	11.7	70.1
Facilities Pads	17, 16	46.3	9.3	55.5
Water Treatment Plant (including Ponds)	17	75.1	15.0	90.2
Total		327.9	50.8	378.7

* Represents the maximum disturbance boundary shown on the Project figures for environmental analysis purposes. Individual developmental drill pads (approximately 0.3 acre each), temporary access, and associated support features will be identified through site-specific drilling work plans and reclaimed following completion of drilling. Actual disturbance at individual drill sites is expected to be substantially less than the maximum disturbance boundary depicted on the figures, which represents a conservative worst-case disturbance envelope.

The Project is planned as a conventional underground mine operation with surface facilities needed to support construction, operation and reclamation. **Figure 2** shows the pre-mine topography of the Project area. The ore bodies identified for the Project are shown on **Figure 3**. Processing of Roca Honda mineralized material will be conducted at Energy Fuels' White Mesa Mill, located approximately 272 miles northwest of the site near Blanding, Utah. The construction, operations, and reclamation of the mine are projected to last approximately 21 years.

The name and legal mailing address of the operators is:

Roca Honda Resources, LLC
225 Union Blvd, Suite 600
Lakewood, CO 80228

2.1 Project Development and Facility Siting

Selecting suitable mine facility locations required the evolution of various practical geographic, technical, and regulatory considerations. While the general location of the mine is dictated by the location of the ore body, the locations of the surface facilities can be managed, to some extent, to maximize efficiencies and balance the geographic, technical, environmental, and regulatory constraints that the site presents.

Following the submittal of the original MORP in 2009, Energy Fuels acquired the mineral rights to properties adjacent to the Project, on July 31, 2015, that contain known uranium resources and an existing mine shaft. The privately-owned property, Section 17, T13N, R08W, is part of the Lee Ranch. This section was extensively explored in the 1970's and early 1980's when more than 500 holes were drilled. The results of that drilling program led Kerr-McGee to sink a concrete-lined shaft to 1,469 feet below ground surface (bgs) in the early 1980s.

The existing Section 17 shaft is currently drilled in the top of the Westwater Canyon Member of the Morrison Formation (the ore bearing horizon) but outside of ore, approximately 200 ft above its planned total depth. It is currently flooded to 750 ft bgs. No development into the ore body from the shaft was completed at that time. Existing surface facilities in Section 17 were constructed in support of the past shaft sinking project, resulting in the disturbance of approximately 21 acres around the mine shaft and construction of a haul road to the shaft from State Highway 605. The disturbed area has been used for ranching operations since abandonment of the shaft and was never reclaimed. Additional wide-spread surface disturbance exists throughout the section from the extensive exploration drilling program. Due to uneconomical conditions for uranium mining, development of the Project was discontinued in 1982.

Proposed facility locations were evaluated in relation to the desired mine shaft locations in Sections 16 and 17. A portion of the surface facilities in Section 17 will be constructed within the previously disturbed area footprint, which minimizes new disturbances. These locations, selected for the mine facilities including the water treatment plant (WTP), are generally located on level ground to the extent possible and otherwise situated to maximize the natural topographic advantages available. Floodplains and steeply sloping ground were avoided to the extent practicable. As shown in the Surface Water Management Plan (**Appendix B**), portions of the Project are located within mapped flood hazard zones. Where avoidance was not feasible, facility siting and design incorporate drainage control and erosion measures as described in Section 3.4 and **Appendix B**. These measures are designed to maintain natural hydrologic flow paths and minimize erosion.

A variety of other factors were also considered in choosing the proposed locations for the facilities including archaeological and cultural resource occurrences, erosion potential, proximity to neighboring residences, visibility and sightlines from the highway, viewshed considerations associated with the Mount Taylor Traditional Cultural Property (TCP) were evaluated using Visual Resource Management (VRM) principles, as well as wildlife considerations and aesthetics. The following sections of this document reflect the planned general arrangement of the mine infrastructure and underground workings, as shown in **Figure 4**, **Figure 5**, **Figure 6**, **Figure 7**, **Figure 8**, and **Figure 9** after consideration of the factors listed above.

2.2 Mineral Claims and Land Tenure

As depicted in **Figure 1**, the Project covers an area of 4,440 acres and includes:

- 63 unpatented lode-mining claims in Sections 9, 10, and 11;
- One adjoining New Mexico State General Mining Lease in Section 16; and
- Fee mineral interest in all of Section 17.

The mining claims also extend onto a 9.4-acre narrow strip of Section 11, which was not included in the proposed mine permit boundary.

The New Mexico State Lease was acquired by David Miller (former Strathmore Minerals CEO) on November 30, 2004, and subsequently transferred to Strathmore Minerals (former owner of the Roca Honda Mine Project). Strathmore subsequently relinquished the lease and acquired it again in December 2015 (HG-0133) for a new 15-year term expiring on December 14, 2030. The “Rocca Honda” Claims in Sections 5 and 6 were staked by Miller and Associates in September 2004 and assigned to RHR on August 28, 2013. Strathmore acquired the “Roca Honda” claims in Section 8 and the fee mineral interest in Section 17 on June 26, 2015, from Uranium Resource Incorporated (URI).

Mining claim numbers RH 252, RH 279, RH 306, and RH 333, located in the southern part of Section 10, overlap into the northern part of Section 15, which is privately owned land, therefore, the overlapping portion of these claims is not valid. The Roca Honda property extends only to the Section 15 boundary.

Mining claim numbers RH 325 to RH 333 are located along the eastern boundary of Section 10, extending west across the Section 11 line by approximately 150 ft.

The initial 63 unpatented, contiguous mining claims (the Roca Honda group), covering an area of approximately 1,248.5 acres, are located on Sections 9, 10, and 11, which are federally owned lands within the Cibola National Forest administered by the U.S. Forest Service (USFS) - See **Table 2**, **Table 3**, and **Table 4** below. Sections 9, 10, and 11 are open to the public, with the land used for a variety of purposes including grazing, mineral extraction, hunting, hiking, and other outdoor recreation activities.

New Mexico General Mining Lease number HG-0133, located on Section 16, covers an area of 638 acres. The mining lease has a primary, secondary, tertiary, and quaternary term, each with annual rentals to be paid in advance. Strathmore first acquired a lease on Section 16 in November 2004 (Lease number HG-0036-002). As there was no provision to extend the lease past 2019 other than by production, Strathmore dropped the lease as its payment came due in December 2015. The New Mexico Land Office held an auction of the lease parcel that same month. Strathmore was the successful bidder. By acquiring the new lease, Strathmore may now hold the

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land until production can begin. At the end of the quaternary term, the lease may be automatically extended if production has begun.

The surface of Section 17, also referred to as the Lee Ranch, is leased to Fernandez Company, Ltd. (Fernandez) as rangeland for grazing.

Table 2. List of Federal Claims held by Roca Honda Resources (RHR/Energy Fuels)

Federal Claim	¼ Sec	Sec-Twp-Rng	BLM Serial No	County	Location Date	In Good Standing
ROCA HONDA #246	NW; NE	10-13N-8W; 9-13N-8W	NM101379274	McKinley	30-Jun-65	Yes
ROCA HONDA #247	NW; NE	10-13N-8W; 9-13N-8W	NM101378276	McKinley	30-Jun-65	Yes
ROCA HONDA #248	NW; NE,SE	10-13N-8W; 9-13N-8W	NM101336452	McKinley	30-Jun-65	Yes
ROCA HONDA #249	NW,SW; SE	10-13N-8W; 9-13N-8W	NM101432406	McKinley	30-Jun-65	Yes
ROCA HONDA #250	SW; SE	10-13N-8W; 9-13N-8W	NM101482102	McKinley	30-Jun-65	Yes
ROCA HONDA #251	SW; SE	10-13N-8W; 9-13N-8W	NM101334819	McKinley	30-Jun-65	Yes
ROCA HONDA #252	SW; SE	10-13N-8W; 9-13N-8W	NM101333461	McKinley	30-Jun-65	Yes
ROCA HONDA #271	NW	10-13N-8W	NM101481347	McKinley	30-Jun-65	Yes
ROCA HONDA #272	NW	10-13N-8W	NM101480569	McKinley	30-Jun-65	Yes
ROCA HONDA #273	NW	10-13N-8W	NM101484570	McKinley	30-Jun-65	Yes
ROCA HONDA #274	NW	10-13N-8W	NM101333411	McKinley	30-Jun-65	Yes
ROCA HONDA #275	NW,SW	10-13N-8W	NM101379361	McKinley	30-Jun-65	Yes
ROCA HONDA #276	SW	10-13N-8W	NM101431523	McKinley	30-Jun-65	Yes
ROCA HONDA #277	SW	10-13N-8W	NM101372205	McKinley	30-Jun-65	Yes
ROCA HONDA #278	SW	10-13N-8W	NM101379226	McKinley	30-Jun-65	Yes
ROCA HONDA #279	SW	10-13N-8W	NM101336273	McKinley	30-Jun-65	Yes
ROCA HONDA #298	NE,NW	10-13N-8W	NM101480402	McKinley	30-Jun-65	Yes
ROCA HONDA #299	NE,NW	10-13N-8W	NM101333224	McKinley	30-Jun-65	Yes
ROCA HONDA #300	NE,NW	10-13N-8W	NM101338876	McKinley	30-Jun-65	Yes
ROCA HONDA #301	NE,NW	10-13N-8W	NM101484199	McKinley	30-Jun-65	Yes
ROCA HONDA #302	NE,NW,SE,SW	10-13N-8W	NM101379288	McKinley	30-Jun-65	Yes
ROCA HONDA #303	SE,SW	10-13N-8W	NM101377506	McKinley	30-Jun-65	Yes
ROCA HONDA #304	SE,SW	10-13N-8W	NM101335760	McKinley	30-Jun-65	Yes
ROCA HONDA #305	SE,SW	10-13N-8W	NM101433626	McKinley	30-Jun-65	Yes

Federal Claim	¼ Sec	Sec-Twp-Rng	BLM Serial No	County	Location Date	In Good Standing
ROCA HONDA #306	SE,SW	10-13N-8W	NM101481490	McKinley	30-Jun-65	Yes
ROCA HONDA #325	NE	10-13N-8W	NM101434814	McKinley	30-Jun-65	Yes
ROCA HONDA #326	NE	10-13N-8W	NM101434021	McKinley	30-Jun-65	Yes
ROCA HONDA #327	NE	10-13N-8W	NM101485234	McKinley	30-Jun-65	Yes
ROCA HONDA #328	NE	10-13N-8W	NM101335611	McKinley	30-Jun-65	Yes
ROCA HONDA #329	NE,SE	10-13N-8W	NM101334244	McKinley	30-Jun-65	Yes
ROCA HONDA #330	SE	10-13N-8W	NM101482069	McKinley	30-Jun-65	Yes
ROCA HONDA #331	SE	10-13N-8W	NM101337707	McKinley	30-Jun-65	Yes
ROCA HONDA #332	SE	10-13N-8W	NM101334957	McKinley	30-Jun-65	Yes
ROCA HONDA #333	SE	10-13N-8W	NM101483670	McKinley	30-Jun-65	Yes

Table 3. State Lease

Lease (State)	Section Area	Sec-Twp-Rng	County	In Good Standing
State of NM	All	16-13N-8W	McKinley	Yes

Table 4. Private Mineral Rights

Mineral Right (Private)	Section Area	Sec-Twp-Rng	County	In Good Standing
Held in Fee	All	17-13N-8W	McKinley	Yes

2.2.1 Project Area by Section

The Project includes multiple Project Land Survey System (PLSS) sections with varying levels of proposed disturbance and infrastructure development. Surface disturbances and mine facilities are primarily proposed in Sections 9, 10, 16, and 17. Other sections, such as Section 11 and Section 15, within the Project area include mining claims and may support limited infrastructure such as access roads, utility corridors, or pipeline alignments.

The distribution of Project activities by PLSS section is summarized in **Table 5** and shown on Figure 4. In addition, quantitative estimates of surface disturbance by PLSS section are provided in Section 3.2.1. **Table 6**, **Table 7**, **Table 8** and **Table 9** list surface facilities and structures with their typical sizes by the section they will be constructed in. These tables also refer to detailed figures showing the locations of these features.

Table 5. Summary of Project Activities by PLSS Section

Section	Land Ownership	Proposed Activities
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ROCA HONDA MINE: Plan of Operations and Mine Operations and Reclamation Plan (PoO-MORP)

9	Federal (USFS)	Access roads and drill pads in support of developmental drilling, ventilation shafts, electrical connections, and a single dewatering well.
10	Federal (USFS)	Access roads and drill pads in support of developmental drilling, mine dewatering wells and piping, ventilation shafts.
11	Federal (USFS)	Access road to Sections 9 and 10.
15	Private	Utility corridor – including access road, dewatering pipeline, powerline (as necessary).
16	State	Production shaft, waste rock stockpiles, ore bins, access roads, dewatering wells, ventilation shafts, dewatering pipeline, and access roads/drill pads in support of developmental drilling.
17	Private	Water Treatment Plant, production shaft, waste rock stockpiles, ore bins, access roads, dewatering wells, ventilation shafts, dewatering pipeline, surface facilities – maintenance shop, dry, and access roads/drill pads in support of developmental drilling.

Table 6. Section 17 - Typical Surface Facilities and Structures (See Figure 8).

Type	Approximate Size	Description
Retention pond (below parking)	180' x 70'	Lined pond with down-gradient monitoring wells
Retention pond (below ore bays)	320' x 150'	Lined pond with down-gradient monitoring wells
Retention pond (below non-ore/shaft material stockpile)	350' x 270'	Lined pond with down-gradient monitoring wells
Ventilation shaft (5)	8' diameter	Ventilation and air sampling station. Permanent enclosed buildings are not anticipated; minor protective equipment housings or partial enclosures may be installed as needed.
Ventilation shaft pad (3)	250' x 250' ea.	Pad for ventilation shaft development – others are situated on shared pads to minimize disturbance
Fuel depot	20' x 50'	Contains a 20 ft and 30 ft diameter fuel tank
Generator pad	100' x 100'	Generator and fuel tanks
Headframe and shaft	30' x 75'	Steel headframe at main shaft opening
Hoist house	200' x 60'	Houses hoist and mechanical equipment in support of the main shaft
Heli-pad	200' x 200'	Pad for landing and take-off of helicopters
Scale/assay house	50' X 50'	First floor - scale house second floor - assay building
Emergency services building	50' x 50'	Houses emergency services vehicles and equipment (e.g., fire truck and ambulance)
Mine rescue and safety	NA	Houses mine safety and rescue equipment and personnel; part of hoist house
Truck wash area	20' x 40'	Wash pad and compressor building
Water tanks (2)	20 ft diameter	Fire and facility use water
Office and Mine Dry	30,572 sqft	Main office
Ore bays (4)	150'x 100' ea.	Stockpile of ore to be sent to mill
Ore pad	150' x 100'	Pad for initial placement of ore from shaft
Parking	60,000 sqft	Approximately 200 spaces for employees and visitors
Storage yard and laydown area	400' x 400'	Maintenance yard and equipment parking

ROCA HONDA MINE: Plan of Operations and Mine Operations and Reclamation Plan (PoO-MORP)

Type	Approximate Size	Description
Maintenance shop	NA	Upkeep and maintenance of surface equipment – Part of the hoist house
Warehouse	NA	Part of hoist house
Power substation	20' x 50'	132 kv electrical substation (fenced area)
Sewage facility	20' x 40'	Processing of sewage waste (septic system)
Non-ore stockpile/shaft material	395,000 sqft	Non-ore materials from mine
Topsoil stockpile	203,475 sqft	Excavated topsoil from site clearing
Pipeline to water treatment plant (Section 17 only)	8,600 ft	HDPE 10-18 inch pipe from shaft to treatment plant
Mine water treatment building	300' x 150'	Houses treatment unit processes
Surge pond	450' x 250'	Lined pond for flow equalization
Treated water reservoir (4)	600' x 600' ea.	Lined ponds for temporary storage of treated water
Treated water discharge pipeline	1,200 ft	HDPE 20-inch pipe from WTP ultimately to Milan
Development drill pads	8.7 ac	Disturbed area to drill borehole (29 holes at 0.3 acres disturbance per pad)
Dewatering Well (5)	36" diameter ea.	Dewatering wells to depressurize workings during development
Dewatering well pad (1)	250' x 250'	Disturbed area to drill borehole (150' x 150' once well completed)

Table 7. Section 16 - Typical Surface Facilities and Structures (See Figure 7).

Type	Approximate Size	Description
Retention pond	215' x 100'	Lined pond with down-gradient monitoring wells
Retention pond (below ore bays)	220' x 130'	Lined pond with down-gradient monitoring wells
Retention pond (below non-ore)	350' x 200'	Lined pond with down-gradient monitoring wells
Retention pond (topdressing and sub-base stockpiles)	250' x 210'	Lined pond with down-gradient monitoring wells
Generator pad	100' x 100'	Generator and fuel tanks
Headframe and shaft	30' x 75'	Steel headframe at main shaft opening
Hoist house	75' x 75'	Houses hoist and mechanical equipment in support of the main shaft
Explosives storage magazine	100' x 100'	Storage buildings for explosives (fenced/bermed area), may alternatively be stored underground
Ore bays (2)	150' x 100' ea.	Stockpile of ore to be sent to mill
Ore pad	150' x 200'	Pad for initial placement of ore from shaft
Sewage facility	40' x 20'	Processing of sewage waste (septic system)
Non-ore stockpile	420,000 sqft	Non-ore materials from mine

ROCA HONDA MINE: Plan of Operations and Mine Operations and Reclamation Plan (PoO-MORP)

Subbase rock stockpile	120,000 sqft	Excavated rock from site leveling
Topsoil stockpile (2)	350,000 sqft	Excavated topsoil from site clearing
Pipeline to water treatment plant (Section 16 only)	3,000 ft	HDPE 10-18 inch pipe from shaft to treatment plant and from dewatering well pads
Development drill pads	1.5 ac	Proposed drilling disturbance area includes pads (5 holes at 0.3 acres disturbance per pad)
Water tank	20 ft diameter	Fire and facility use water
Dewatering Wells (8)	36" diameter	Dewatering wells to depressurize workings during development
Dewatering well pad (3)	250' x 250' ea.	Disturbed area to drill borehole – 5 wells share a pad near shaft (150' x 150' will be final footprint. <i>Note:</i> 250' x 250' initial size of pads during drilling). One pad extends into Section 9.
Dewatering well shared pad w/vent shaft (1)	250' x 250'	Disturbed area to drill borehole
Ventilation/escape shaft (1)	8' diameter	Ventilation and air sampling station. Permanent enclosed buildings are not anticipated; minor protective equipment housings or partial enclosures may be installed as needed.
Ventilation shaft (4)	8' diameter ea.	Ventilation and air sampling station. Permanent enclosed buildings are not anticipated; minor protective equipment housings or partial enclosures may be installed as needed.
Ventilation shaft pad (1)	250' x 250' ea.	Pad for ventilation shaft development – others are situated on shared pads to minimize disturbance

Table 8. Section 10 - Typical Surface Facilities and Structures (See Figure 5).

Type	Approximate Size	Description
Ventilation/escape shaft (1)	8' diameter	Ventilation and escape shaft and air sampling station
Ventilation shaft (3)	8' diameter ea.	Ventilation and air sampling station. Permanent enclosed buildings are not anticipated; minor protective equipment housings or partial enclosures may be installed as needed.
Ventilation shaft pad (3)	250' x 250' ea.	Pad for ventilation shaft development - others are situated on shared pads to minimize disturbances
Development drill pads	31.5 ac	Proposed drilling disturbance area includes pads (105 holes at 0.3 acres disturbance per pad)
Dewatering well pad (6)	250' x 250' ea.	Disturbed area to drill borehole – 2 wells share a pad with a vent shaft - (150' x 150' will be final footprint. <i>Note:</i> 250' x 250' initial size of pads during drilling)
Dewatering Wells (7)	36" diameter ea.	Dewatering wells to depressurize workings during development
Pipeline to water treatment plant (Section 10 only)	9,000 ft	HDPE 10-18 inch pipe from shaft to treatment plant

Table 9. Section 9 - Typical Surface Facilities and Structures (See Figure 6).

Type	Approximate Size	Description
Ventilation/escape shaft (1)	8' diameter	Ventilation and air sampling station. Permanent enclosed buildings are not anticipated; minor protective equipment housings or partial enclosures may be installed as needed.
Ventilation shaft (1)	8' diameter	Ventilation and air sampling station. Permanent enclosed buildings are not anticipated; minor protective equipment housings or partial enclosures may be installed as needed.
Ventilation shaft pad (1)	250' x 250' ea	Pad for ventilation shaft development
Dewatering well pad (1)	250' x 250' ea	Disturbed area to drill and install well (150' x 150' will be final footprint. <i>Note:</i> 250' x 250' initial size of pads during drilling). This pad extends into Section 16.
Dewatering Wells (1)	36" diameter	Dewatering wells to depressurize workings during development
Development drill pads	1.8 ac	Proposed drilling disturbance area includes pads (6 holes at 0.3 acres disturbance per pad)
Pipeline to water treatment plant (Section 9 only)	800 ft	HDPE 10-18 inch pipe from shaft to treatment plant

2.2.2 Off-Site Ore Transportation

Uranium ore produced from Project will be transported by truck to the White Mesa Mill in Blanding, Utah for processing, as described in Section 2.0. Ore transportation will occur on public roadways and may include limited segments of haul roads across Section 16 (State trust land) and Section 17 (private land); no ore transportation will occur on USFS lands. Accordingly, ore hauling is not a component of operations authorized under this MORP/PoO.

Transportation will be conducted by licensed commercial carriers in compliance with applicable federal, state, tribal, and local requirements, including U.S. Department of Transportation regulations. Ore will be transported in covered, sealed trailers designed to prevent material loss during transit.

Transportation practices, handling procedures, and safety requirements for ore shipments are further described in the Energy Fuels Uranium Ore Transportation Policy (May 2024), which is implemented by the operator and transportation contractor independent of this MORP/PoO. This policy outlines responsibilities of the mine operator, transportation contractor, and mill; shipment controls (including exclusive-use transport, vehicle closure, and placarding); training requirements; emergency response procedures; and radiation protection measures consistent with applicable regulations.

Ore hauling is described here for informational purposes only and will be evaluated as a connected action in the environmental analysis prepared pursuant to the National Environmental Policy Act.

3.0 Mine Operations Plan – 19.10.6.602.D.(15)

3.1 Type And Methods of Mining - 19.10.6.602.D.(15)(A) AND (B)

- (a) A description of the type and method of mining and the engineering techniques proposed, and how the operation will meet the performance and reclamation standards and requirements of this Part.*
- (b) A map or maps at a scale approved by the Director and an approximate schedule or timetable indicating the mining operations including number of acres of land to be disturbed. A permittee will be required to follow the sequence described in the schedule or timetable, unless modified or revised. A permittee will not be required to meet specific dates for initiation or completion of mining according to the schedule or timetable.*

3.1.1 Material Definitions

A variety of materials will be discussed in subsequent sections. They are introduced here for consistency. These materials would be excavated during site preparation, construction and operations.

Topsoil: the “A” soil horizon or other soil material capable of supporting vegetation, as defined in NMAC 19.10.1.7. Topsoil is present within the Project area, although it is generally thin and variably developed. During site preparation, topsoil will be salvaged where present. In areas where topsoil is limited or indistinguishable, suitable surface and near-surface materials capable of supporting vegetation will be salvaged. Topsoil is considered non-mineralized. Therefore, associated stockpiles, disturbance areas, and retention pond areas will not be lined.

Topdressing: Geological material and other amendments capable of supporting vegetation, as defined in NMAC 19.10.1.7)

Sub-base rock: After the topsoil has been removed from a disturbed area, further excavation will be performed by removing the sub-base rock to the required depth. Sub-base rock materials are considered non-mineralized based on geologic characterization and will be evaluated during excavation, as appropriate, to confirm non-mineralized status.

These materials may be temporarily stockpiled and will be managed in a manner protective of human health and the environment, including implementation of appropriate BMPs to control wind and stormwater erosion. Sub-base rock materials are considered non-mineralized. Therefore, associated stockpiles, disturbance areas, and retention pond areas will not be lined.

Sub-base materials will be used, as practicable, for construction and reclamation activities, or otherwise managed in accordance with applicable requirements.

Ore-bearing materials: Material containing economically recoverable uranium that is excavated during mining operations. Ore may be temporarily staged at the surface prior to being transported off-site for processing (see Section 2.2.2). Any temporary staging will be limited in duration and volume consistent with operational needs. Ore stockpiles will be managed to minimize potential impacts from wind and stormwater erosion, including use of appropriate BMPs such as surface stabilization, runoff controls, and operational practices to limit exposure time. Pads and retention ponds associated with mineralized ore stockpiles will be lined.

Non-ore development rock: Material excavated during development of shafts, stations and haulage levels or driving drift. Generally, non-ore development rock is excavated and brought to the surface but contains limited recoverable uranium. The non-ore development rock will be stockpiled then returned to the underground workings and shafts as backfill as mine development progresses. Should excess materials remain after backfilling is complete, it may be loaded into over the highway haul trucks and transported from the Project area to be processed as ore at the White Mesa Mill. Non-ore development rock stockpiles may contain mineralized materials therefore pads and retention ponds associated with those stockpiles will be lined.

3.1.2 Site Preparation and Initial Construction Activities

Upon obtaining necessary permit approvals, RHR will mobilize a workforce of company employees and contract personnel to begin site preparation and access road development. Access road(s) will be constructed, and ingress and egress to the site will be via these roads, as shown on **Figure 4, Figure 5, Figure 6, Figure 7, Figure 8** and **Figure 10**. Haul and access/utility roads are currently designed as 56 feet in width while access roads to well and vent pads are 36 feet in width. Typical cross sections of the 2 road types are as shown in appendix A. Final road design and specifications will be determined upon final equipment selection to confirm adequate width. Roads will be constructed using typical large earthmoving equipment in the manner as follows:

- Stake limits of disturbances;
- Clear and grub vegetation;
- Salvage and stockpile topsoil;
- Rough grading and cut and fill using dozers, graders, trucks, shovels, etc.;
- Fine grading using graders, compactors, trucks, shovels, etc.; and
- Placement and compaction of subbase and road base materials.

Roads and surface facility areas will be graded using conventional earthmoving equipment (cut and fill, as necessary) to establish design contours prior to construction. Roads will be constructed with suitable base and subbase materials (e.g., soil and aggregate) in accordance with applicable state and USFS specifications to provide stable travel surfaces, adequate drainage, and minimize erosion. Dust abatement measures will be implemented during construction and operations, including application of water or other suppressants, as needed.

Where necessary, RHR will clear and grub the surface facilities areas of the mine site and the WTP area to begin preparing them for construction. Topsoil and sub-base rock will be removed, as necessary, and stockpiled. RHR's Baseline Data Report (BDR) (RHR, 2020), contains a detailed characterization of the topsoil that exists on-site. The volumes of material that will be stockpiled and used in the proposed reclamation are further discussed in Section 3.2. Suitable materials that will be removed above the rock layer will be stockpiled together, identified as topsoil, and protected from erosion using BMPs for use in concurrent and final reclamation of the site.

The three major areas for site preparation will be the surface facility footprints around the production shafts in Sections 16 and 17, the dewatering wells in Sections 9, 10, 16, and 17, and the WTP facilities in Section 17, including the discharge pipeline. **Figure 4, Figure 5, Figure 6, Figure 7, and Figure 8** show the locations of the initial surface facilities. A detailed discussion of the surface facilities is presented in Section 3.2. In addition, development drilling to further define the ore body will begin. **Figure 11, Figure 12, Figure 13, and Figure 14** show the approximate areas where development drilling will take place.

RHR recognizes the sensitivity and importance of the presence of cultural resources. RHR conducted multiple archaeological surveys of the Project area and designed surface facilities to avoid eligible archaeological sites where possible. The BDR submitted to the NM Mining and Minerals Division (MMD) and the Cibola National Forest (CNF) contained surveys which produced a detailed inventory of sites, including those potentially eligible for listing on the National Register of Historic Places and/or on the State Register of Cultural Properties. RHR will work with the appropriate State and Federal authorities to confirm site classifications and verify that sites are protected and/or the required clearances have been granted. These inventories may be updated, as needed.

Eligible sites will be further investigated, and avoidance and mitigation plans will be devised to protect them during construction, operations, and reclamation. For example, some sites that could be disturbed by development activities may be excavated to recover data prior to construction. The surface facility layout has been and may be further modified to protect and avoid sites where possible.

Prior to initiating surface disturbance activities, proposed construction areas will be field verified by a qualified archaeological monitor against site archaeological survey results conducted previously. Mitigation measures to further protect cultural resources that may be required by the regulatory agencies will be implemented prior to beginning construction activities. An archaeologist will be present to monitor surface disturbance, as needed.

Stormwater sedimentation and run-off containment or diversion structures will be constructed as part of initial site preparation work. A Stormwater Pollution Prevention Plan (SWPPP), will be developed in compliance with U.S. Environmental Protection Agency (USEPA) and State of New Mexico requirements and will be implemented. SWPPP development will occur in advance of construction and disturbance activities, and implementation will continue throughout applicable phases of the Project.

3.1.3 Mine Dewatering

Dewatering activities will be implemented progressively as mining advances through the Project area, including Sections 17, 16, 9, and 10. Dewatering wells will be installed in advance of or concurrent with mine development in each section, as required based on hydrogeologic conditions. RHR submitted a report titled Assessment of Potential Impacts from Mine Dewatering at the Proposed Roca Honda Mine, McKinley County, NM (INTERA, 2011) to the NMOSE on November 7, 2011, in support of its Mine Dewatering Application. The report was also submitted to the United States Forest Service (USFS), the New Mexico Environmental Department (NMED) and the New Mexico Mining and Mineral Division (NMMMD) in support of its Mine Permit Application and Plan of Operations. The report provided analysis of potential impacts on existing water uses when groundwater is pumped at the rates and for the period of mining described above. Following questions that arose during the Environmental Impact Statement (EIS) process with the USFS, the report was revised and resubmitted in August 2012 (INTERA, 2012).

Third-Party groundwater modelling consultants have constructed a numerical groundwater flow model of the San Juan Basin to evaluate the potential impact the proposed dewatering activities might have on local and regional groundwater and surface water systems, including those for the nearby population centers of Grants, Gallup, Milan, Crownpoint, San Mateo, and the Acoma and Laguna Pueblos. Impacts are defined as changes in groundwater levels or flows at wells and springs. The numerical model of groundwater flow was constructed and calibrated to estimate predevelopment groundwater levels, i.e., groundwater levels prior to the year 1930 for conditions prior to the onset of large-scale mining in the Grants uranium belt. A transient numerical model of

groundwater flow to estimate changes in groundwater levels from 1930 to 2012 caused by pumping from public water supply wells, mine dewatering, and recovery from historic mine dewatering was constructed and calibrated. The model, which was reviewed and accepted by the OSE simulates changes to the 2012 hydraulic groundwater levels during and after dewatering at the proposed Roca Honda Mine.

Previous groundwater modeling conducted for the Roca Honda Project evaluated earlier versions of the proposed mine plan, including the mine configuration evaluated in the 2017 INTERA assessment. Because the current Project mine plan, dewatering configuration, and mine sequencing differ from the configurations evaluated in prior modeling, those prior predictive results are retained as historical project information but are not relied upon as the final predictive basis for the current Project.

RHR has updated the groundwater model to evaluate the current mine plan and dewatering configuration. The updated model will be used to evaluate predicted mine inflows, groundwater-level changes, potential effects to springs and other water resources, and groundwater recovery following cessation of dewatering.

The updated modeling results will supersede prior predictive conclusions to the extent that the current mine plan differs from the assumptions used in the earlier models.

The regional geology, geology of the project area, and a map of geologic structures in the region are provided in **Figure 15**, **Figure 16**, and **Figure 17**, respectively.

RHR was issued a Mine Dewatering Permit B-1706 Points of Diversion (PODs) 12 through 31 in March 2014 by the New Mexico Office of the State Engineer (NMOSE), for the proposed Roca Honda Mine following a protest of the application and hearing (HU No. 12-004) in November 2013. The permit authorizes temporary pumping of groundwater primarily from the Westwater Canyon Member of the Morrison Formation at a depth of 1,800-2,600 feet below ground surface (bgs) in order to develop an underground uranium mine. It also authorizes pumping of groundwater from the overlying (shallower) aquifers, the Dakota Sandstone and Gallup Sandstone. Under the conditions of permit approval, pumping will occur from wells located in Sections 16, 9 and 10. The number and location of dewatering wells and mine shafts in each section were specified in the permit. As part of the settlement resulting from the permit hearing, the State Engineer, Acoma Pueblo, and RHR agreed to Stipulated Facts and Conclusions which set out the location to be dewatered, the time over which dewatering would occur, and the upper limits of the quantities to be dewatered from particular well locations.

Because the Project mine plan has been revised since issuance of Mine Dewatering Permit B-1706, the existing permit will require amendment by the New Mexico Office of the State Engineer (NMOSE) to reflect the current mine design. The permit amendment is expected to include revisions to the locations of certain points of diversion (dewatering wells), dewatering sequencing, groundwater modeling, pumping schedules, and other operational parameters as appropriate. Accordingly, the final locations, pumping rates, pumping durations, and operating conditions for individual dewatering wells will be established through the NMOSE permit amendment process and supporting engineering analyses. The dewatering system described in this MORP represents the conceptual basis for Project planning and environmental review and may be refined through final engineering and regulatory approvals.

Mine dewatering will be implemented in phases that correspond to the progression of underground mine development. Early-phase dewatering will support rehabilitation of the existing Section 17 shaft and initial underground development. Subsequent phases will expand

dewatering into Sections 16, 9, and 10 as underground workings advance. The number, location, and pumping schedules of dewatering wells will be adjusted through the amended NMOSE permit to reflect the phased progression of mining.

In July 2015, RHR acquired the mineral rights to Section 17 T. 13N R. 8W, adjacent to Section 16- one of three sections included in the approved dewatering permit. RHR has revised its mining plan to incorporate Section 17 with its existing mine shaft, and to redistribute and reduce pumping in Sections 9, 10, and 16. The new mine plan will allow RHR to mine more efficiently and safely, while also minimizing the amount of new surface disturbance by utilizing preexisting disturbed areas within Section 17 for locating support facilities. Under the new mine plan, the area subject to dewatering has been modified to include Section 17 with additional points of diversion in Sections 16 and 17 to be added. Previous groundwater models indicate the total amount of groundwater pumped from the Westwater Canyon Member will be increased by an average of 200 gpm over what was permitted under B-1706 PODS 12 through 31, and dewatering will occur for an additional two years. Dewatering portions of the mine will occur for approximately 12 years. Construction and operation of the mine will proceed in several phases. The timing and sequence of the dewatering/depressurizing and the aquifers dewatered will proceed in phases that reflect the underground progression of the mine workings. *Phase 1* will involve the rehabilitation of the Section 17 shaft and initial mine development, i.e. excavation of declines or drifts to access the ore zones. *Phase 2* will commence concurrently with mine development activities in Section 17 and will consist of dewatering/depressurizing the area near the planned Section 16 shaft. *Phase 3* will consist of extending the drift into Section 9 and Section 10. Mobilization to Section 9 will occur following development through Section 16, consistent with the overall mine sequencing plan. Infrastructure installation, including vent pads and access roads, will occur in advance of or concurrent with mining activities in Section 9 (i.e. - ventilation shaft construction with advancement of the underground workings). The dewatering well locations shown in **Figure 18** represent the conceptual layout for the current mine plan and may be refined during final engineering and the NMOSE Mine Dewatering Permit amendment process..

These wells will be designed, permitted, and constructed in accordance with the NMOSE requirements, as outlined in NMAC 19.27.4.31. Prior to being cased and grouted, wells will be logged using geophysical instruments to determine screened intervals and construction requirements. Once constructed, the water produced at each well will be routed via surface pipe to the WTP for treatment prior to discharge. Operation of these wells will occur pursuant to conditions approved by the updated mine dewatering permit.

Dewatering wells will be constructed to accommodate anticipated pumping requirements for the targeted aquifers (e.g., Westwater Canyon Member). The anticipated 18-inch diameter reflects the typical internal casing or completed well diameter, whereas the 36-inch diameter represents the maximum borehole diameter during drilling and construction. Final well construction (including borehole and casing diameters) will be determined during detailed design based on hydrogeologic conditions and pumping requirements.

3.1.3.1 Mine Dewatering Conveyance System

Groundwater produced from the dewatering well network in Sections 9, 10, and 16 will be conveyed to the Water Treatment Plant in Section 17 through a network of HDPE conveyance pipelines. The pipelines are part of the mine dewatering system and constitute supporting utility infrastructure. Pipeline alignments will generally follow existing or proposed access roads and utility corridors to minimize new surface disturbance and facilitate construction, inspection, maintenance, and eventual reclamation. Depending on site-specific engineering requirements, individual pipeline segments may be surface-laid, buried, or otherwise stabilized as necessary. Final pipeline alignments may be refined during detailed engineering while remaining within the approved disturbance corridors. Well Construction and Layout

Each dewatering well will generally include:

- A drilled borehole (up to approximately 36 inches in diameter);
- Steel casing (typically smaller internal diameter, e.g., ~18 inches);
- Screened intervals across target water-bearing zones, as appropriate;
- Gravel pack and sealing materials; and
- A wellhead assembly with valves, controls, and protective housing.

During well construction, each dewatering well pad may include temporary support features such as drilling mud pits, cuttings containment pits, temporary sumps, and equipment staging areas necessary to safely construct and develop the well. These temporary features will be located within the approved disturbance limits shown on the typical dewatering well pad layout (Figure 19). Drilling fluids and cuttings will be managed in accordance with applicable state and federal requirements. Upon completion of drilling and well development, temporary construction features that are no longer required, including mud pits, cutting pits, temporary sumps, and excess construction materials, will be removed or backfilled, regraded, and reclaimed. The completed dewatering well pad will then be reduced to its permanent operational footprint, as illustrated in Figure 41 (Completed Dewatering Well Typical Use) and Figure 43 (Completed Dewatering and Vent Shaft Pad Typical Use), for the duration of mine operations.

Dewatering well pads are not intended to function as permanent waste rock or topsoil storage areas. Any temporary stockpiling of excavated material or salvaged topsoil required during construction will be confined to the immediate work area and either returned to the excavation during site restoration or managed elsewhere within the Project in accordance with applicable operational and reclamation requirements.

3.1.3.2 Pump Specifications and Capacity

Dewatering wells will utilize submersible pumps installed within the well casing. Pump specifications will be finalized during detailed engineering; however, typical design parameters include:

- Pump type: Submersible turbine or equivalent;
- Capacity: Sized to meet anticipated dewatering rates (consistent with Project flow estimates and aquifer characteristics);
- Operating range: Adjustable based on water levels and system demands; and
- Materials: Suitable for expected water quality conditions.

3.1.3.3 Power Supply

Pumps will be powered via:

- Surface (overland) electrical distribution systems connected to site infrastructure; and
- Temporary generators, if needed during early phases prior to installation of permanent power.

Electrical controls and power supply components will be housed in small, low-profile surface enclosures located at or near the wellhead.

3.1.3.4 Power Distribution Infrastructure

Where line power is utilized, power distribution lines will be installed along established access corridors or co-located with existing or proposed infrastructure, to the extent practicable, to minimize surface disturbance. Relevant Project figures will be updated to depict the general routing of power distribution to dewatering wells, as appropriate for the level of design.

3.1.3.5 Phase 1 Dewatering Plan

The new mine plan anticipates that during the first phase of mining, an existing mine shaft on Section 17 will be rehabilitated. In advance of shaft rehabilitation, up to four wells will be drilled around the perimeter of the shaft at a distance of 650-800 feet from the shaft to a depth of approximately 1,500-1,800 feet bgs and screened in the Westwater Canyon Member. The shaft will be rehabilitated downward from land surface, and these wells will be pumped for up to 320 days at a total rate of up to 2,000 gpm i.e., 500 gpm per well, prior to shaft rehabilitation reaching the top of the Westwater Canyon Member. The shaft currently extends from land surface down through the upper part of the Westwater Canyon Member, and because the shaft already passes through and seals off the geologic formations above the Westwater Canyon Member, water is not anticipated to be produced from these formations during rehabilitation or mining. During shaft rehabilitation through the Westwater Canyon Member, the shaft will also become a point of diversion. The five wells and the shaft are identified as PODs 32 through 36 in the existing mine dewatering permit. After completion of the shaft through the Westwater Canyon Member, the wells will continue to be pumped for as long as they aid in dewatering the mine. However, as Section 17 mine development begins, it is anticipated that the shaft will function as the main point of diversion of water produced from the Westwater Canyon Member for the mine. The wells around the shaft will produce incrementally less water as mine development proceeds and eventually will no longer contribute to mine dewatering. At that time pumping will cease but the wells will be retained for emergency purposes. At that point, most of the water being produced from the Section 17 mine shaft area will be drawn up to the surface through the shaft from underground water management facilities.

3.1.3.6 Phase 2 Dewatering Plan

After rehabilitation of the Section 17 shaft, underground mining will be extended into Section 16, and three to five additional wells will be constructed as needed into the Westwater Canyon Member along the course of the underground decline in Section 16 and pumped to minimize inflow of groundwater into the mine workings in advance of decline construction. Pumping from the new points of diversion will commence during year 2 of mine operations, consistent with the mine dewatering permit.

Each dewatering well drill pad will initially occupy an area approximately 250 feet by 250 feet to accommodate the drill rig, temporary mud pits, cuttings containment, temporary sumps, water management features, support equipment, and staging areas necessary during well construction. Following drilling, well development, and installation of permanent facilities, temporary construction features will be removed, disturbed areas will be regraded, and the operational pad will be reduced to approximately 150 feet by 150 feet unless the pad also contains a ventilation shaft, in which case the 250-foot by 250-foot footprint will remain. (see **Figure 19**, **Figure 41**, and **Figure 43**). It should be noted that the surface disturbance of the wells installed during shaft construction will be within the overall mine surface facility disturbed area footprint and are not accounted for as “new disturbance”. Water produced from the wells and shafts will be piped to the WTP for treatment prior to being discharged via the treated water pipeline.

Mine water management will evolve over the life of the Project. During initial mine development, groundwater will primarily be removed through the conceptual dewatering well system to facilitate safe shaft construction and mine access. As underground development advances and groundwater inflows encountered during underground mining will increasingly be managed within the mine workings, the reliance on surface dewatering wells is anticipated to decrease. Individual dewatering wells may be incrementally removed from service as they are no longer required to achieve the desired groundwater drawdown. Groundwater encountered within the underground workings will subsequently be collected through the mine's internal drainage system, including underground sumps and pumping stations and, as necessary, pumped to the on-site Water Treatment Plant (WTP) for treatment prior to discharge through the proposed treated water pipeline to the Rio San Jose. This phased transition represents the anticipated long-term mine water management strategy for the Project.

Dewatering wells that are no longer required for groundwater control may be retained as operational and/or emergency water supply wells rather than immediately abandoned, where appropriate and in accordance with applicable regulatory approvals. Water produced from these wells may be used for beneficial on-site purposes, such as dust suppression, construction activities, contingency in emergency, or other operational needs, provided such use complies with applicable permits and water quality requirements.

Existing permitted shallow wells completed in the Gallup Formation within Sections 16 and 17 may continue to provide non-potable water for sanitary, domestic support, and other facility-related uses independent of the mine dewatering system.

Except for these limited beneficial on-site uses, the Project does not propose alternative routine off-site discharge locations or disposal methods for groundwater removed during mine dewatering. The primary long-term disposition of mine water remains treatment at the WTP followed by discharge through the permitted outfall to the Rio San Jose.

3.1.3.7 Monitoring

Dewatering wells and associated conveyance pipelines will be routinely monitored and inspected during operations to verify system integrity. Pipelines will be subject to regular inspection, and any identified leaks or failures will be promptly addressed through repair or replacement, with appropriate corrective actions implemented to prevent recurrence.

3.1.4 Shaft Construction

Site and mine development will begin in Section 17. The existing mine shaft in Section 17 will be incorporated into the Roca Honda Mine plan by using the shaft to produce ore and provide

underground access to Section 16. The shaft is currently completed to a depth of 1,469 feet bgs. Kerr-McGee, the previous developer of the Section 17 Project, anticipated completing the shaft to a total depth of 1,669 feet bgs. The WTP, discharge pipeline, retention ponds, and other necessary surface facilities would be constructed in Section 17 prior to beginning dewatering in Section 17. Once the WTP and initial dewatering pipeline construction are complete, the Section 17 shaft will be dewatered, rehabilitated as needed, and then sunk to total depth. Two mining levels will be used to access the ore body in Section 17. A drift (tunnel) from the upper mining level (1-4 level) will be advanced from the bottom of the shaft to the planned shaft location in Section 16.

Typical conventional shaft sinking involves vertical excavation from the ground surface downward. Excavation consists of a cycle of drilling, blasting, excavating or removing rubble (i.e., mucking and hoisting), installing or constructing a liner on the shaft walls in the excavated area and repeating the process until the ore horizon is reached. Up-reaming or raise boring shafts is also possible in competent rock formations and may be used for either ventilation or production shafts. The process involves drilling a pilot hole from the surface into an underground excavation, either a drift or stope (mine opening), where a large diameter drill bit can be attached and then pulled up to the surface. As the boring is advanced, drill cuttings fall into the mine workings where they are removed with underground mining equipment. When sinking the shaft from the surface through water-bearing strata, careful shoring and sealing of the shaft lining is necessary, and pumping facilities are needed. When raise boring, the shaft is lined from the surface by lowering the liner segments into the boring and grouting between the liner and surrounding rock as is done in conventional methods. Because the Section 17 shaft already exists to 1,469 ft bgs, the approximate 200-foot extension will be excavated using the conventional sinking technique with a final diameter of 18 feet.

In addition to dewatering/depressurizing as described in Section 3.1.3, grout will be used to further reduce the inflow of water into the shaft. Grout is a liquid material that, when solidified, forms a seal that reduces or eliminates the flow of water in the area where it is applied. Using grout technology facilitates control of the inflow of water from the formation being grouted during the construction of the shaft, and importantly, during the operating life of the mine.

There are a number of ways grout can be introduced into the formation. Fundamentally, the approach is to drill a number of holes from the surface around the circumference of the shaft then pump grout into the formation, forming a “curtain” in the formation in the geologic strata surrounding the shaft excavation. In the grouting process, liquid cement is forced into the water-bearing earth under very high pressure. On mixing with the water, the cement solidifies the adjacent area preventing groundwater inflow into the shaft.

The use of the conventional shaft sinking method allows the segregation of aquifers or water-bearing formations by facilitating the ability to seal such intervals prior to penetrating the formation. The Gallup and Dakota Sandstone formations are expected to be under hydraulic pressure and produce water in volumes that can be controlled by surface grouting. When shaft sinking reaches the top elevation for the interval to be sealed, a probe hole will be drilled into the water-bearing formation. The hole will be equipped with special packers and gauges to measure water volumes and pressures. If volumes and pressures are within acceptable tolerance levels, shaft sinking will resume without grouting. If volumes and pressures are outside of these levels, grouting will be implemented prior to advancing the shaft sinking process. **Figure 20, Figure 21, and Figure 22** show the typical stratigraphy anticipated to be encountered at Roca Honda. **Figure 23** shows a typical grout curtain scenario in more detail.

It is anticipated that the production shaft in Section 16 will be constructed using the raise bore method initiated from the underground workings. For shafts constructed using raise boring or up-reaming methods, complete isolation of water bearing formations is not possible until the bore hole has been fully drilled, and the liner installed. However, dewatering wells installed prior to raise boring, as described previously for the surface sinking method, would limit the amount of water that would flow into the shaft during construction. Further, water flowing into the shaft would drain into the lowest point of the workings in the Westwater Canyon Member thereby preventing potential cross contamination of aquifers during the construction period. Water accumulating in the shaft would be pumped to the WTP for treatment prior to discharge. Shaft sinking activities will proceed using either of the methods described above through the water-bearing formations. After the liner has been installed the grout will remain in the surrounding formation providing a seal to minimize water inflow. Water that continues to flow into the shaft will be controlled by installing “water rings” to gather the water and direct it to temporary collection sumps at the shaft bottom. Water rings are heavy cast-iron segments, with flanges for connecting, and bolted together in place. Water collected in the sumps will be pumped to the surface where it will be treated at the WTP prior to discharge. As noted above, the excavated shaft material will be brought to the surface during shaft construction using conventional hoisting equipment. This material will be segregated as appropriate and placed in designated stockpile areas on the surface at the mine site. A permanent hoist house for operations will be installed before shaft construction is completed.

Upon completing shaft construction, a permanent pumping level station will be developed to accommodate mine dewatering during mine operations. **Figure 24** shows details of a typical pump station. Ultimately, the production shafts will be fitted with permanent 85-foot-tall headframes and hoists for operations.

3.1.5 Ventilation Holes and Escape Shafts Construction

In year 1, Section 9/16 ventilation shaft construction will begin and will be timed to reach the shaft station level simultaneously with dual decline development from Section 17. The approximately 11,800-ft long decline that connects the Section 17, 9/16, and 10 mineralized zones has been designed as a twinned heading. This is required for ventilation purposes, both during the driving of the decline, as the need for booster fans is eliminated, and for subsequent mining in Section 10. When completed, one of the decline headings will serve as a dedicated fresh airway connecting the Section 10 and 9/16 workings to the Section 17 production shaft fresh air intake. The other decline heading will serve as a dedicated exhaust airway, connecting to the various exhaust boreholes in the Section 9/16 mining area, thus supplementing the exhaust capacity of the boreholes in the Section 10 area. Depressurizing of the water in the decline area will precede the initiation of the decline construction, and it will be maintained after completion.

Dewatering wells will be installed in advance of the drift and additional vent shafts constructed by up-reaming methods in the locations shown on **Figure 18**.

The deposit will be developed and mined based on single-pass ventilation using a series of separate and independent intake and exhaust networks. The exact number of ventilation shafts that will be installed in the Project area will be determined as detailed engineering and mine development occur. The locations of vent shafts currently planned are shown in **Figure 4**. Ventilation shafts will be constructed using raise boring methods and are anticipated to have maximum diameters of approximately 8 feet, depending on final ventilation requirements and engineering design. The first ventilation shafts will be installed in Section 17 using the raise boring method. **Figure 25** shows a typical raise bore drill rig and set up. Raise boring or up-reaming uses

a drill rig set up on the surface to drill a pilot hole into an underground drift, tunnel or stope previously excavated by a mining crew. Once the pilot hole breaks into the opening underground, the mining crew assembles and attaches a large reamer bit (in this case approximately 8 feet) to the smaller diameter drill string. The reamer bit is then pulled to the surface while continuously rotating to cut the hole to final diameter. The cuttings from the drilling fall back down to the mining level where they are mucked out of the opening, hauled back to the shaft, and then hoisted to the surface, tested and transported to the appropriate material stockpile shown on **Figure 4**.

Surface disturbance at each ventilation shaft location will include the shaft collar, ventilation fan installation, power supply infrastructure, and limited staging/laydown areas, as shown on **Figure 43**. The total surface disturbance per ventilation shaft is expected to range from approximately 0.25 to 1.0 acre, depending on site-specific conditions and final design.

Ventilation shaft pads are not intended to function as permanent waste rock or topsoil storage areas. Any temporary stockpiling of excavated material or salvaged topsoil required during construction will be confined to the immediate work area and either returned to the excavation during site restoration or managed elsewhere within the Project in accordance with applicable operational and reclamation requirements.

Permanent enclosed buildings are not anticipated at ventilation shaft locations. However, minor protective structures, such as equipment housings, electrical cabinets, instrumentation shelters, or partial enclosures, may be installed as needed to protect electrical and mechanical components, support monitoring equipment, and facilitate safe operation and maintenance of the ventilation system. These structures are expected to be low-profile and substantially smaller than conventional buildings.

Water from the Gallup and Dakota Sandstone formations will flow into the hole and be collected in a sump underlying the vent hole. If excessive water inflow is encountered, seepage from the Gallup and Dakota Sandstone formations can be controlled by grouting the formations from the surface as was described for shaft construction in Section 3.1.4.

Groundwater inflows encountered during construction of ventilation shafts are anticipated to be controlled using conventional pressure grouting techniques, as necessary, based on site-specific geotechnical and hydrogeologic conditions. Artificial ground freezing is not incorporated into the current Project design or engineering basis for this MORP.

Artificial ground freezing is recognized as an engineering technique that may be considered for underground construction projects under unusual hydrogeologic conditions. However, because it is not part of the proposed Project design, no refrigeration plant, freeze pipe system, brine circulation system, temporary freezing infrastructure, or associated construction layout has been developed or incorporated into this MORP. Should unforeseen subsurface conditions identified during final engineering or construction warrant evaluation of an alternative groundwater control method, the proposed modification would be subject to appropriate engineering evaluation and any required environmental and regulatory review prior to implementation.

Once groundwater inflows have been controlled by grouting and the hole has been reamed to final diameter, the vent hole will be lined with steel, concrete, or both. The liner will be designed to prevent inflow from the aquifers. Water within the Westwater Canyon Member is not anticipated to present a constraint, as the pilot hole will intersect the underground workings in an area that will have been dewatered in advance using dewatering wells and/or underground dewatering methods.

The ventilation holes will be designed to either introduce fresh air or exhaust air from mine workings at a rate of approximately 200,000 cubic feet per minute. As the underground mine workings expand, air flow directions in vents may need to be changed to balance fresh air intake and exhaust requirements. In this manner intake vents may become exhaust vents and vice versa. Air movement will be provided by an electric motor and fan assembly mounted horizontally on the surface on a concrete pad. This design will allow dual purpose use of some of the ventilation holes as emergency escape ways for mine personnel at the haulage level and mine working level elevations. As necessary or where noise studies indicate the need, ventilation fans may be shrouded to reduce noise impacts. The current mine plan anticipates using the production shafts in Section 17 and Section 16 as the main air intakes with the vents acting as exhausts. The production shafts in Section 16 and Section 17 will be designed using downcast ventilation, in which fresh air is pulled down the shafts and is distributed throughout the mine. Fresh air will also be vented upward from the haulage level, which is below the ore level, to the mine working level (ore level) by means of raises or development drifts.

Ventilation shaft locations and associated infrastructure will be sited to minimize surface disturbance, utilize existing access where practicable, and reduce visibility and noise impacts. RHR will also incorporate design measures (e.g., fan shrouding and siting considerations) to minimize operational impacts.

The final number, layout, and placement of ventilation shafts will be determined during detailed engineering and ongoing mine development, consistent with the phased mine sequencing described in this document and will also be informed by air quality modeling conducted under the National Emission Standards for Hazardous Air Pollutants (NESHAP) requirements.

Certain ventilation shafts may also serve as secondary escapeways in accordance with applicable mine safety requirements. The final location, configuration, and equipment associated with escapeway shafts will be determined during detailed engineering and reflected in subsequent design documents. Escapeway shafts are not anticipated to require permanent enclosed buildings. Surface infrastructure is expected to consist primarily of the shaft collar, ventilation equipment, personnel access facilities, safety and communications equipment, electrical service, and, where required, a compact emergency hoisting or personnel retrieval system. Any protective equipment housings or partial enclosures associated with these facilities will be limited to those necessary for safe operation, maintenance, and equipment protection. (See Figure XX. Conceptual Escapeway/Ventilation Shaft Surface Configuration).

Final ventilation fan equipment and layout will be determined during detailed engineering based on airflow requirements, mine development sequencing, and regulatory/safety requirements.

3.1.5.1 Fan Installation and Layout

Surface ventilation systems will generally include:

- Primary fans (axial or centrifugal) mounted at ventilation shafts (intake and/or exhaust);
- Ducting or shaft connections directing airflow to/from underground workings;
- Fan housing and support structures (e.g., skid-mounted or concrete pad installations);
- Flow control features (e.g., dampers, louvers, silencers, or regulators, as needed); and
- Electrical control panels and instrumentation located in small, low-profile enclosures.

Figure 40 shows a typical surface ventilation fan installation, including the fan configuration, shaft connection, and associated surface infrastructure.

3.1.5.2 Fan Specifications and Capacity

Ventilation fans will be sized to meet mine ventilation and safety requirements. Final specifications will be determined during detailed design; however, typical parameters include:

- Fan type: Axial or centrifugal, depending on system design;
- Capacity: Sized to deliver required airflow volumes for underground operations and compliance with applicable safety standards;
- Operating flexibility: Variable speed or adjustable controls to accommodate changing mine conditions; and
- Materials and construction: Suitable for expected environmental and operational conditions.

3.1.5.3 Power Supply

Ventilation fans will be powered via:

- Surface (overland) electrical distribution systems connected to site power infrastructure; and
- Temporary generators, if required during initial construction or prior to installation of permanent power.

Electrical equipment (e.g., motor control centers, transformers, and control panels) will be housed in small, low-profile surface installations located near the fan sites.

3.1.5.4 Power Distribution Infrastructure

Where line power is utilized, electrical distribution lines will be routed along existing or planned access corridors and co-located with other infrastructure where practicable, to minimize surface disturbance. Relevant Project figures will be updated to depict the general routing of power distribution to ventilation fans, consistent with the level of design detail.

3.1.6 Proposed Development Drilling

The purpose of development drilling is to provide additional data for more detailed mine planning and certainty in resource estimations. RHR anticipates drilling approximately 200 development holes following issuance of the FEIS and approval of the MMD permit to mine. Development drilling activity will take place within areas that were heavily drilled 40-50 years ago. Abundant evidence of previous drilling includes old drill pads and two-track roads that were largely unreclaimed. Where possible, RHR will use old drill pads and roads to minimize new ground disturbance. Proposed drilling areas were included in the baseline biological and cultural resource study areas completed in recent years, allowing avoidance plans to be developed using existing information. Drilling Best Management Practices (BMP's) were developed based on industry-standard guidance, site-specific baseline studies, and engineering design considerations, and will be refined as appropriate through agency coordination and permitting. The following BMP's will be used where possible:

- Locating drill holes in previously disturbed areas or areas that will be disturbed by other development activities;
 - Using common or overlapping drill pads;
 - Avoiding eligible archaeological sites;
 - Utilizing existing roads or two-track trails;
 - Use of a common staging area for equipment and supplies within areas that will be affected by future mine development;
 - Avoiding significant drainage features, including mapped channels, ephemeral and intermittent drainages, and areas exhibiting defined bed and bank morphology;
 - Controlling fluids to prevent releases from the drill sites;
 - Avoiding drilling near active migratory bird or raptor nests through third-party pre-disturbance surveys conducted in accordance with generally accepted professional survey protocols during the appropriate survey season for the target species, and coordinated with the appropriate resource specialists having jurisdiction over the lands where the surveys are conducted. If active nests are identified, appropriate avoidance buffers and seasonal restrictions will be implemented in accordance with applicable regulatory guidance and in coordination with the applicable land management agency and the New Mexico Department of Game and Fish.; and
- Performing contemporaneous reclamation.

Prior to implementation of developmental drilling activities on National Forest System lands, RHR will prepare site-specific drilling work plans identifying proposed drill hole locations, temporary access routes, anticipated disturbance limits, staging areas, and environmental protection measures. Where practicable, the work plans will identify opportunities to utilize existing roads, previously disturbed areas, or overlapping drill pads to minimize new surface disturbance. These work plans will be provided to the U.S. Forest Service for review consistent with the approved MORP. Development drilling will be conducted using typical truck-mounted or track-mounted exploration drill rigs commonly used for mineral resource characterization. These rigs generally fall within standard industry ranges (e.g., approximately 50 to 150 horsepower, depending on configuration and depth requirements) and are consistent with the scale of disturbance described in this document (approximately 0.3 acres per drill pad). Drill pads will include temporary mud pits/sumps used to contain drilling fluids and cuttings. Sumps will be constructed as needed based on site conditions and drilling requirements and are typically (See **Figure 42** – Typical Development Drill Pad Layout):

- Approximately 10 to 20 feet in length and width, and
- Approximately 3 to 6 feet in depth

Sumps will be located within the drill pad disturbance area and managed in accordance with best management practices (BMPs), including containment of fluids and prevention of offsite migration. Following completion of drilling, sumps will be backfilled, regraded, and reclaimed, consistent with contemporaneous reclamation practices.

Using an estimate of 0.3 acres of disturbance (~120 ft. X 100 ft.) per drill pad, the amount of temporary disturbance associated with planned drilling activities is approximately 60 acres, most of which would occur in Sections 9 and 10. Temporary disturbance refers to short-duration use of drill pads, which will be reclaimed following completion of drilling activities. Actual disturbance

associated with temporary drill pads and access routes will be documented through field mapping and GIS. This information will be used to verify that all drilling disturbances remain within the approved DRA boundaries and to support contemporaneous reclamation activities. Disturbance extents will be updated periodically to reflect actual conditions. Summary information, including GIS data of disturbance areas, will be made available to participating federal and state agencies upon request or at the conclusion of drilling activities or field seasons, as appropriate.

Developmental drilling may be conducted on either a single-shift or continuous (24-hour) basis, depending on the drilling contractor, seasonal conditions, operational requirements, and project schedule. Where continuous drilling is conducted, temporary lighting may be required during nighttime operations to support safe working conditions. Temporary light plants or other portable lighting systems will be positioned and shielded, to the extent practicable, to direct illumination toward active work areas and minimize off-site light spill. Lighting associated with developmental drilling will be temporary in nature and will be removed upon completion of drilling activities at each location. Where nighttime drilling is proposed, the site-specific work plan will identify the anticipated lighting configuration and the measures that will be implemented to minimize off-site light spill.

Figure 19 shows the configuration and approximate size of a typical drill pad although each pad will be shaped to fit the topography rather than a simple rectangle. Additionally, several pads will overlap and multiple holes may be drilled from a single pad thereby reducing the amount of disturbance. Table 10 shows the estimated number of holes and disturbance area by land ownership and Development Drill Area (DRA). Access to drill pads will utilize existing roads, previously disturbed areas, and historic drill access routes wherever practicable. Where rehabilitation of historic routes or construction of short temporary access segments is necessary to safely support drilling activities, those disturbances are included within the applicable Development Drill Area (DRA) and associated disturbance acreage presented in **Table 10**.

Table 10. Development Drilling Details

Area	Public Land Survey Location			Land Ownership	Drilling Area (acres)	Disturbance (acres)	# of Holes
	Twp	Rng	Sec				
DR-1-10	13N	08W	10	Public/Cibola Forest	43.7	29.1	97
DR-2-10	13N	08W	10	Public/Cibola Forest	3.1	1.8	6
DR-3-10	13N	08W	10	Public/Cibola Forest	1.0	0.6	2
FC-1-9	13N	08W	9	Public/Cibola Forest	28.8	15.6	52
FC-2-10	13N	08W	9/10	Public/Cibola Forest	3.4	1.5	5
FC-3-9	13N	08W	9	Public/Cibola Forest	0.6	0.3	1
FC-4-16	13N	08W	16	State of New Mexico	1.8	0.9	3
DR-4-16	13N	08W	16	State of New Mexico	8.0	3.9	13
FC-1-17	13N	08W	17	Private	10.4	3.0	10
LR-3-16	13N	08W	16	State of New Mexico	5.9	1.6	7
LR-3-16	13N	08W	17	Private	3.6	.9	5
LR-4-17	13N	08W	17	Private	2.5	1.2	4
LR-5-17	13N	08W	17	Private	2.1	0.6	2
<i>Cibola Forest Subtotal</i>					80.6	48.9	163

<i>State of New Mexico Subtotal</i>	15.7	6.4	23
<i>Private Land Subtotal</i>	18.6	5.7	21
GRAND TOTAL	114.9	61	208

*Note: The maximum amount of temporary (i.e. - 3-4 years) disturbance within the drill area boundary

Development drilling will be confined within the boundaries of the Development Drill Areas (DRAs) shown on Figures 11 through 14. Because the exact locations of individual drill holes, drill pads, staging areas, and temporary access routes cannot be determined until drilling is implemented, the DRAs were delineated to represent the maximum anticipated temporary disturbance associated with development drilling activities. The disturbance envelope includes new temporary access routes as well as rehabilitation of historic drill access routes or previously disturbed roads that may be necessary to safely support drilling operations. Although use of existing or previously disturbed routes minimizes the need for construction of entirely new roads, rehabilitation of historic routes may require vegetation clearing, grading, drainage improvements, or other minor surface disturbance. Accordingly, these areas have been incorporated into the DRA disturbance envelope and associated disturbance acreages presented in Table 10 for planning and environmental analysis purposes. Actual physical disturbance is expected to be less than the maximum disturbance envelope through continued use of existing roads, overlapping drill pads, and contemporaneous reclamation. Drilling activities conducted on National Forest System lands, including within Sections 9 and 10, will require prior approval from the U.S. Forest Service and will be implemented in accordance with applicable federal and state regulatory requirements.

3.1.6.1 Developmental Drill Pad Configuration

Each developmental drilling location will include a temporary drill pad sized to safely accommodate the drill rig, support equipment, water storage, and drill cuttings management. As depicted on **Figure 42**, drill cuttings may be temporarily contained within a lined cuttings pit or other appropriate containment system during drilling operations, depending on site conditions, drilling methods, and regulatory requirements in effect at the time of construction. The liner is intended to facilitate containment and management of drill cuttings and drilling fluids, minimize infiltration to underlying soils, and simplify removal of drilling materials following completion of drilling. Upon completion of drilling activities, drill cuttings will be managed in accordance with applicable regulatory requirements, the lined pit will be removed, and the drill pad will be reclaimed in accordance with the contemporaneous reclamation procedures described in Section 6.5.

Prior to commencement of each developmental drill hole, a gamma radiation survey will be performed at the proposed drill hole location to establish pre-disturbance conditions. Following completion of drilling and reclamation, a post-reclamation gamma radiation survey will be conducted at the reclaimed drill hole location in accordance with applicable New Mexico Mining and Minerals Division (MMD) exploration drilling guidelines. Survey records will be maintained as part of the Project's environmental compliance documentation.

3.1.6.2 Cuttings Management and Drill Site Remediation

Drill cuttings generated during developmental drilling will be temporarily contained within designated cuttings management areas located on the drill pad. Lined cuttings containment may be utilized where appropriate based on drilling methods and site conditions. Cuttings and excavated materials will be managed in accordance with applicable regulatory requirements. Where required by permit conditions or applicable regulations, drill cuttings will be characterized to support appropriate handling, reuse, or disposal.

Following completion of drilling activities, temporary liners (if used), cuttings management features, and associated temporary facilities will be removed. Drill holes will be plugged and abandoned, as appropriate. Drill pads and temporary access routes will then be regraded, topsoil replaced where appropriate, and revegetated in accordance with the reclamation procedures described in MORP Section 6.

3.1.6.3 Management and Reclamation of Temporary Drilling Disturbances

Temporary drill pads, mud pits, sumps, drill cuttings, and associated drilling disturbances will be managed in accordance with the New Mexico Mining Act, NMAC 19.10.6, the New Mexico Environment Department's Guidance for Meeting Radiation Criteria Levels and Reclamation at New Uranium Mining Operations, and the Project's Baseline Data Report (Section 13) and Sampling and Analysis Plan. These documents establish the project-specific radiological characterization methodology, survey procedures, quality assurance/quality control requirements, investigation criteria, and analytical protocols that will be implemented during drilling activities and reclamation of temporary drilling disturbances.

Temporary mud pits may be constructed, as necessary, to support drilling of dewatering wells, groundwater monitoring wells, geotechnical borings, and exploration borings. Temporary drill pads and associated disturbances will be limited to the minimum area necessary to safely conduct drilling activities. Stormwater Best Management Practices (BMPs), including diversion berms, sediment control measures, stabilized construction entrances where appropriate, and erosion control measures, will be implemented as necessary to minimize erosion, sediment transport, and off-site migration of drilling fluids or drill cuttings.

Drill cuttings, drilling fluids, and other drilling-related materials will be contained within the approved drill pad disturbance area. Temporary mud pits and sumps will be maintained only for the duration necessary to support drilling activities and are not intended as permanent mine facilities. Following completion of drilling, drilling fluids will be removed or allowed to evaporate, as appropriate, and temporary mud pits and sumps will be dewatered, backfilled with suitable material, regraded to approximate surrounding contours, stabilized, and reclaimed in accordance with Sections 6.0 and 7.7 of this MORP.

Drill cuttings and other materials generated during drilling will be characterized in accordance with applicable regulatory requirements and project-specific radiological characterization procedures. Materials requiring management under applicable regulatory standards will not be left at temporary drill sites and will be managed or disposed of in accordance with applicable state and federal requirements. Radiological characterization, confirmation surveys, and any additional investigations determined necessary based on field observations, radiological survey results, or applicable regulatory requirements will be completed prior to final reclamation in accordance with the Project Sampling and Analysis Plan, the Baseline Data Report (Section 13), applicable NMED guidance, and other regulatory requirements.

Temporary drill pads, rehabilitated historic access routes, temporary access roads, staging areas, and other drilling disturbances that are no longer required for drilling activities or monitoring will be reclaimed as soon as practicable following completion of their intended use. Reclamation will generally include removal of temporary facilities and materials, restoration of natural drainage patterns, redistribution of salvaged topsoil where available, installation of erosion control measures as necessary, and revegetation using the approved native seed mix consistent with the reclamation provisions of this MORP.

3.1.7 Mine Operations

Mine operations will begin once the production shaft in Section 17 and required ventilation shafts are completed, and a permanent sump is constructed at the lowest point of the mine shaft to provide a collection point for mine dewatering. Water produced from the mine as development advances and work areas are excavated, will be collected and held in the sump to remove sediment with the aid of decantation trenches. The collected water will be pumped through a series of pump stations to the surface, where it will be pumped to the WTP for treatment, as necessary to meet discharge standards. This will help mitigate groundwater effects on mine development, which is further detailed below.

3.1.7.1 Haulage Level

The haulage level development will begin under the ore horizon as soon as practical after shaft construction has been completed. The haulage level of the mine serves several purposes. It provides a location from which to conduct longhole drilling underground that further defines the ore body. The longholes then provide a means of additional dewatering of the mining level by providing drainage from below. The haulage level also provides the clean air ventilation passageway and importantly, it provides the ore transport route from ore chutes to the hoisting transfer facilities.

Figure 26 illustrates the concept of longhole drilling in underground mining. It is a dual-purpose technique used to define the mineable portion of the ore body and to help dewater the portion of the formation to be mined. Information obtained from the longhole drilling will be used to obtain a detailed understanding of the ore distribution within the mining zone and develop a corresponding extraction plan. Use of this technique reduces significantly the surface disturbances required for development drilling. Development drifts will be excavated following the longhole drilling to enable ore extraction.

As shown in **Figure 26**, the longhole drilling machine, located at the haulage and/or ore level, is capable of drilling at the working face (see front view) for distances into the rock of 200-300 feet ahead of the excavation in predetermined patterns. The top and side views show how the longhole drilling will be performed radiating out and up into the rock at various angles. The longholes will allow the water to drain from the rock in advance of excavation. The holes will also provide access into the rock with geophysical probes that will allow the ore to be more carefully defined.

During initial development of the haulage level, the excavated material will be hoisted to the surface and placed in stockpiles. As noted previously, the haulage level is located below the ore horizon; therefore, the excavated material is not expected to contain ore-bearing mineralogy and is classified as non-ore development rock. Nonetheless, this material will be stored in stockpiles on the surface of the mine site, tested and handled in a manner protective of human health and the environment.

As development of the mine continues, increased amounts of non-ore development rock may be used as backfill in developed areas of the mine which will no longer be mined. This non-ore development rock will not be brought to the surface but rather be utilized for concurrent mine reclamation and minimizing surface stockpile footprints.

Ore will be removed by typical blasting techniques which entail drilling holes into the working face and inserting explosives. After blasting the material face, the rubblized (blasted) ore materials will be moved away from the face using load/haul/dump (LHD) equipment or a cable drag machine, known as a slusher, to a designated collection point. From the collection point, the ore will be

loaded on an underground truck, transported to the bottom of the production shaft and then loaded into the hoist destined for surface deposition in ore bays.

3.1.7.2 Ore Mining Method

The ore body present in the underground workings will be extracted using either a step room-and-pillar or drift-and-fill mining method depending on the characteristics of each ore zone. Both are common mining methods which are flexible and economically viable. **Figure 27** and **Figure 28** illustrate the layout in step room-and-pillar and drift-and-fill extraction methods, respectively.

In room-and-pillar mining, mined material is extracted across a horizontal plane while leaving "pillars" of material in place to support the rock above and resulting in open areas or "rooms" (stopes) underground. Step room-and-pillar mining is a variation in which the sill or bottom elevation of an inclined ore body is adapted for the use of rubber-tired equipment. Because every ore body is different, applications of step room-and-pillar mining cannot be fully generalized, however, this type of mining generally applies to ore deposits with thicknesses from 6 to 20 feet and dips ranging from 15 to 30 degrees.

This type of mine is normally developed on a grid creating a regular mining pattern that may be modified to reflect specific geologic conditions in the host rock. The percentage of material mined varies depending on many factors, including the material mined, width of the pillar required for roof support, and roof conditions.

Step room-and-pillar mining features a layout in which stopes and haulage-ways cross the dip of the ore body in a polar coordinate system. By orienting haulage-ways at certain angles across dip, stope floors assume an angle ($<10^\circ$) that is easily traversed by rubber-tired equipment (see **Figure 27**). The main development of step room-and-pillar mining includes a network of parallel transport drifts on either side of the ore pod. These transport drifts provide one-way traffic for mine equipment and also provide fresh air ventilation into mine working areas. Stopes are advanced forward by drifting from the center haulage-way outwards to the parallel transport drifts. The next step is to excavate a similar drift or side slash one step updip or downdip and adjacent to the first drive. This procedure is repeated until the roof span becomes too wide to remain stable and an elongated strip is left as a "pillar." Pillars left in place to support the roof of the mine are typically either barren of ore or are of such low grade that they are left in place rather than removed. In some cases, the pillars contain sufficiently high mineralization that they can ultimately be removed using the drift-and-fill method discussed below.

A 10-foot-wide room will be excavated followed by leaving a 10-foot-wide pillar for support. Heights of rooms and pillars are not expected to exceed 12 feet. In cases where stope thickness exceeds 12 feet the stope will be mined in equal vertical lifts to the extent possible (i.e., a 20-foot-thick stope will be mined in two 10-foot intervals). The first 10-foot interval is mined and then backfilled so the second 10-foot interval can be mined. In this case the backfill becomes the floor for the second 10-foot interval that will be extracted. The length of a particular room or pillar is determined by the width of the ore pod being extracted. The width of pillars at the Roca Honda Mine is normally expected to be 10 feet. Room widths can vary with rock strength but are not expected to be smaller than 10 feet nor greater than 50 feet. Each ore pod will be separated into 200-foot stopes. Stopes will be separated by a sill (lowest elevation of ore) drift connecting each parallel transport drift on either side of the ore pod. This sill drift aids in ventilation and transportation of material.

As mining advances in an up-dip direction, rooms mined first will be filled with a cemented backfill and pillars will be partially mined. The purpose of cemented backfill is to provide a safe working

environment for the miners. It will prevent the mine roof from collapsing or caving when the pillars are partially removed. Cemented backfill will also help in reduction of radon emanation from low grade pillars. As mining advances into the room, roof bolts will be placed in the ceiling to prevent collapse. Roof bolts are long steel rods that are inserted and tightened into holes drilled up into the ceiling of the rooms. The roof bolts will be further supplemented as necessary with the use of wire mesh draped on the ceiling and sidewalls and held in place with the roof bolt. The use of these techniques will further enhance the safety of the working environment. **Figure 29** shows a typical roof bolting operation.

In some areas of the mine, ore grade will be high enough to support drift-and-fill mining. Drift-and-fill mining allows for a higher extraction rate of ore.

The drift-and-fill mining method is the same as the step room-and-pillar mining method except that in the drift-and-fill method, pillars created while mining are ultimately removed because of the high ore grade they contain. The higher ore grade can justify the additional operational challenges of using additional engineered backfill to provide the stability needed to extract the pillars while maintaining a safe working environment. Those areas of the ore body that contain sufficiently high ore grade to justify use of the drift-and-fill method will first be mined using the step-room and pillar method. Backfill will then be used to replace the pillars while the drift-and-fill method is employed.

Mined ore will be brought to the surface and staged on concrete pads (NMAC 19.10.6.602.D.(15)(c)(i)) in the ore bays in Sections 16 and 17 awaiting transport off-site for processing. The capacity of these bays in 16 and 17 is approximately 12,500 tons. These three-walled concrete bays will have sloped concrete floors, each with a drain to catch and allow captured water to be piped to a surge pond prior to entering the WTP. The bays will have a sump to collect solids before the water enters the surge pond. The solids will be cleaned out periodically, allowed to dry and transported off-site with the ore.

3.1.7.3 Backfill

Roof collapse or caving will be prevented by backfilling previously mined rooms with non-ore development rock and/or aggregate sourced from an existing, permitted commercial aggregate quarries located within the regional Project vicinity. licensed pit, imported into the mine from the surface. The primary source of backfill material will be non-ore developmental rock stockpiled within the surface facility areas in Sections 16 and 17, as depicted in **Figure 4, Figure 5, Figure 6, Figure 7, and Figure 8**. Early in the mine development and operation, excavated non-ore development rock from the mine will have to be hoisted to the surface and stockpiled as it is produced. This material cannot be stockpiled underground initially because of the limited space. As the underground workings are established and stope mining begins, this material will be reintroduced from the surface back into the mine as backfill.

One of the Westwater Canyon Member dewatering wells in Section 16 will be completed as a 36-inch diameter well and cased (lined) to serve as a “backfill raise” in the future once it is no longer needed as a dewatering well. Stockpiled non-ore development rock on the surface will be transported through this backfill raise into the mine, as needed, mixed with cement and placed in mined out rooms as stope mining progresses. Backfill provides in-ground support by reinforcing the roof, which in turn allows for complete or partial removal of adjacent pillars, depending on the extraction technique used.

Ore extraction from stopes will continue for some time after development access to ore pods has been completed. The surface stockpile of backfill material will continue to be depleted until stockpiled material has been reintroduced to the mine. When this occurs, material will be sourced

from an offsite local quarry to continue with backfill operations. This material will be a clean aggregate with sufficient geotechnical characteristics to be used as backfill and characterized prior to use to verify that it does not present a potential impact to groundwater.

Over the mine life, an estimated 2.24 million tons of backfill will be needed. Of this total, approximately 387,000 tons of underground non-ore development rock will be directly placed into stopes. The non-ore development rock stockpiles will total approximately 516,000 tons, which includes hoisted non-ore development rock, surface excavations, main shaft, and other mine surface structure excavations. The remaining approximately 1.34 million tons of backfill material will be sourced from existing, permitted commercial aggregate quarries located within the regional Project vicinity (e.g., the San Mateo, New Mexico area and surrounding region). A specific quarry source has not been pre-selected. Final source selection will occur during detailed engineering and construction planning and will be based on material suitability, availability, haul distance, cost, and environmental considerations. It is anticipated that backfill material will be obtained from previously permitted and actively operating facilities, and no new borrow areas or quarry development are proposed as part of this Project. Once a source (or sources) is identified, additional information—including location, haul routes, and material characteristics—will be provided, as appropriate, in subsequent design submittals or permitting documentation. Haul routes for trucks transporting backfill materials to the Project will utilize existing road networks to the maximum extent practicable, and transportation will be managed to minimize traffic, dust, and other potential impacts to local communities and the environment.

3.1.7.4 Mining Operations Schedule

Mine development and mining will proceed by the following general timeline:

- Construct surface BMPs and necessary diversions in Section 17 and along pipeline corridor;
- Construct the water treatment plant (WTP) and water reuse pipeline (main discharge line to Rio San Jose);
- Drill surface dewatering wells and begin dewatering Section 17;
- Begin the rehabilitation of the Section 17 Shaft, including:
 - Build and install head frame and hoist;
 - Inspect and repair the existing shaft; and
 - Install Pumping stations and piping.
- Deepening of the shaft by approximately 297 ft (177 ft to shaft bottom and an additional 120 ft for sump and water storage);
- Begin the construction of the Section 16 Shaft;
- Begin the 11,788-ft long dual decline from Section 17 to Section 10;
- Mining of the Section 17 mineralization;
- Crosscut to Section 9 and Section 16 from the decline and begin mining Sections 9/16; and
- Terminate the decline at Section 10 and begin mining Section 10.

Table 11 provides a generalized schedule for construction, operation and reclamation of the Roca Honda Mine Project in compliance with NMAC Section 19.10.6.602.D.(15)(b). It is an approximate schedule of mining operations; however, the true life of the mine may be different as development drilling and underground development occur. Regulations at NMAC Section 19.10.6.602.D.(15)(b), recognize that a mine life may vary by stating that a permittee “not be

required to meet specific dates for initiation or completion of mining according to the schedule or timetable.”

The schedule reflected in **Table 3** begins with day one after the day that permit approvals are received for the Project. A permit approval date of November 02, 2028, is assumed in order to present the schedule in months and years as required by NMMMD. On day one, mobilization will occur to begin preparation of various site areas prior to the start of construction activities. The critical early activities include: the construction of the discharge pipeline from the WTP location to the discharge point at the Rio San Jose (**Figure 31** and **Figure 31a**), construction of the water treatment facilities, and installation of the dewatering wells in Section 17. It is anticipated that these major site construction activities will be completed within the first 12 to 18 months.

Other early development activities will include additional drilling to better define the characteristics of the ore body and provide information needed to update an economic feasibility study. Development drilling will likely occur in phases, with the first phase completed in year one following permit approvals and a second phase the next year.

*Table 11. Mine Schedule**

Activity	Start Date	End Date
Initial Development		
Feasibility and confirmation drilling	Nov 30, 2028	Jan 31, 2029
Mobilization to Sec 16 and 17	Sep 30, 2029	Oct 31, 2029
Site preparation/road construction in Sec 16 and 17	Oct 31, 2029	Aug 31, 2030
Construct dewatering/reuse pipeline to Rio San Jose	Oct 31, 2029	Aug 31, 2030
Construct water treatment plant in Section 17	Oct 31, 2029	Aug 31, 2030
Facility construction in Sec 16 and 17	Oct 31, 2029	Aug 31, 2030
Construct Sec 17 dewatering wells	Oct 31, 2029	Aug 31, 2030
Rehab Sec 17 existing shaft	Nov 30, 2028	Jan 31, 2029
Dewater Sec 17 shaft	Sep 30, 2030	Jun 30, 2031
Complete Sec 17 shaft to final depth	Dec 30, 2031	Jun 30, 2032
Sec 17 mine development and dewater ore body	Jun 30, 2032	Jul 31, 2035
Dewater Sec 17 to Sec 16 drift	Jun 30, 2031	Jul 31, 2032
Drift to Sec 16 shaft location	Jun 30, 2032	Sep 30, 2033
Ore Production		
Mining of Sec 17 ore	Jun 30, 2031	Aug 31, 2036
Dewater Sec 16 shaft	Jan 31, 2032	Dec 31, 2034
Develop access roads through Sec 10, 11 and 15	Jan 31, 2032	July 1, 2032
Upstream Sec 16 shaft/Develop shaft stations	Sept 30, 2033	Sept 30, 2034
SW/NE Sec 16 ore body mine development	Feb 28, 2035	Jan 31, 2041
Construct dewatering wells on surface in Sec 9	Jan 31, 2033	Jun 30, 2033

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Dewater Sec 9	Jun 30, 2033	Dec 31, 2033
Mining of Sec 9 ore	Dec 31, 2034	May 31, 2038
Construct dewatering wells on surface in Sec 10	May 31, 2038	Jan 31, 2039
Dewater Sec 10	Jan 31, 2039	Jun 30, 2039
Mobilization to Sec 10	Jun 30, 2039	Jun 30, 2039
Additional site preparation/road construction	Jun 30, 2039	Aug 31, 2040
Sec 10 ore body mine development	Jun 30, 2039	Sep 30, 2043
Reclamation		
Backfilling Underground Workings	Oct 1, 2043	Jun 30, 2045
Surface Reclamation Earthwork	Jul 1, 2044	Dec 31, 2048
Closure Monitoring	Jan 1, 2049	Jun 30, 2052

*** Schedule assumes permit approval date of Nov 2, 2028. Start and End dates are estimated and may change.**

The schedule in Table 11 is a planning-level schedule. Activities dependent upon regulatory approvals, groundwater conditions, final engineering, or actual mine conditions will be adjusted as necessary while remaining consistent with the approved MORP.

It is assumed for the purpose of the **Table 11** schedule that treatment of water produced from the dewatering wells may be required. Ore production from Section 17 could begin quickly after the shaft is sunk to depth. The first ore is planned to be produced approximately 90 days following completion of the Section 17 production shaft. Initial development is scheduled to be completed within three years after commencement of the Project at which time full production will begin. Mine development work in Section 16 would be ongoing as mining in Section 17 ramps up.

The main drift from Section 17 will continue to the location of the Section 16 production shaft (six months into the Project). This timeframe assumes that the dewatering wells around the Section 16 shaft location have been operating. Additionally, the mining unit will be dewatered underground ahead of the miners. As such, the construction schedule of the shaft is dependent upon the dewatering activities. As described in more detail in Section 3.1.3, RHR has an approved mine dewatering permit.

The estimated life span of the Project is approximately 21 years. Of that period of time, ore will be produced for 11 years. The remaining time consists of construction, reclamation, and closure monitoring activities. Reclamation will begin on portions of Sections 17 and 16 after the end of production. Some Section 17 surface facilities, particularly the WTP, will remain operational throughout the life of the mine. Reclamation of the entire mine, including placement of non-ore development rock remaining on the surface back underground, will be completed approximately six years after mining has been completed.

As noted previously, the schedule presented in **Table 11** is for general planning purposes only. As provided for in the regulations, the actual schedule for the Project will be dictated by many factors yet unknown, including the dates the permits are approved, the actual conditions encountered during construction, and the volume of ore ultimately available to be extracted. The remainder of this section is intended to provide a more detailed understanding of the work that will be undertaken to construct, operate, and reclaim the Project in a manner that meets the performance and reclamation standards of the various state and Federal regulations that apply.

3.2 Maps and Plans for the Mine Facility -19.10.6 602 D.(15)(c)

Maps and plans indicating the location, size and capacities for the mine facilities including:

- *leach pads, heaps, ore dumps and stockpiles;*
- *impoundments;*
- *ponds;*
- *diversions;*
- *disposal systems;*
- *pits;*
- *tailings disposal facilities;*
- *mills;*
- *water treatment facilities;*
- *storage areas for equipment, vehicles, chemicals and solutions;*
- *topsoil and topsoil stockpiles;*
- *waste rock dumps; and*
- *other facilities or structures.*

As described in Section 1.0, the Roca Honda Mine Project area encompasses four full sections of land, i.e., Sections 9, 10, 16, 17, as well as the disturbance area associated with the access road in Section 11, utility corridor in Section 15, dewatering pads, and the mine water discharge pipeline leading into and out of the Mine Project area. Anticipated surface facilities include haul and utility roads, ore bays, retention (holding) ponds, diversion channels, sanitary wastewater treatment facilities, water treatment plant facility, warehouse and storage areas for equipment, vehicles, chemicals and solutions, maintenance building, topsoil stockpiles, sub-base rock stockpiles, non-ore development rock stockpiles, parking areas, mine shafts, ventilation shafts and escape ways, hoist buildings and head frames, drill holes, dewatering wells and dewatering pipeline network, fences, power and drinking water lines, surface water runoff control features, and a treated water discharge pipeline. The NMAC requirements specify the various mine facilities that must be discussed. The Roca Honda mine will not have leach pads, heaps, pits, tailings disposal facilities, or mills. This section discusses those facilities that remain in the NMAC subject area.

3.2.1 Surface Facilities

Surface facilities were located to minimize potential environmental impact and cultural resource disturbance (NMAC 19.10.6.602 D.(15)(c)(i-xiii)). The surface facilities will be fenced with 8-foot cyclone fencing material topped with angled 3-strand barbed wire or equivalent. **Table 12** lists the combined disturbance area per section.

The estimated surface disturbance areas associated with road construction (new roads and improvements to existing roads) are shown below in Table 13.

Table 12. Disturbance Area Per Section

Section	Disturbance area (acres)
9	3.4
10	25.6
11	8.7 (reestablish existing forest road)
15	10.3
16	73.5
17	183.5
TOTAL	304.9

Table 13. Disturbance By Road Type

Road Type	Disturbance area (acres)
Haul Roads	24.1
Access/Utility Corridors	9.8
Re-established Forest Service Road (Section 11)	8.7
Vent Shaft Access Roads	5.0
Dewatering Well Access Roads	14.7
TOTAL	62.2

Prior to final closure, roads located on NFS lands will be evaluated in coordination with the USFS to determine which roads will be reclaimed in accordance with applicable requirements and guidance. Any roads not authorized to remain in place will be reclaimed and included in the reclamation bond. If retention of specific roads is requested at the end of Project life, RHR will coordinate with USFS via written communication and the reclamation bond will be adjusted accordingly.

For roads not located on NFS lands, reclamation and retention will be determined in accordance with the State of New Mexico requirements and in coordination with the neighboring rancher. See **Figure 10** for more detail on site access road locations relative to the Project.

Figure 5, Figure 6, Figure 7, and Figure 8 provide a more detailed view of the proposed surface facilities and associated surface disturbances in Sections 9, 10, 16, and 17, including the anticipated locations of the production shafts, ventilation shafts, and dewatering wells. **Figure 10** and **Figure 31** show the additional disturbance for the haul roads, utility corridor dewatering pads and treated water discharge pipeline. Preliminary design drawings are included in **Appendix A**. The majority of the surface area disturbance will occur on Section 17 with the majority being from the stockpile areas, larger support facilities, and the water treatment facility's footprint. Most of the surface disturbance in Section 16 will be stockpile areas, production shaft support facilities, ventilation shafts, and dewatering well pads. It should be noted that the only disturbances anticipated in Section 9 are the construction of ventilation shafts, dewatering wells, associated mud pits (see Section 3.1.3.1 for construction details and concurrent reclamation), and access road/utility corridors.

Disturbance in Section 10 is anticipated to be comparable to that described for Section 9. Disturbance of Section 15 consists of a road and utility corridor connecting Sections 10 and 16. It is also anticipated the mine will use an existing Forest Service Road which runs east/west through Section 11, connecting to the east side of Section 10 where dewatering well and ventilation shaft pads will be located. This existing service road will be improved and reestablished as needed to accommodate traffic from the east side of the Project through Section 11, ultimately connecting to Section 10.

Concurrent with the mine dewatering system (see Section 3.1.3) and shaft construction (see Section 3.1.4), will be the construction of other pertinent surface facilities. An archaeologist will be on call to monitor surface disturbance activities, as discussed previously. Archaeological sites will be protected as necessary; topsoil will be removed and stockpiled, and the sites will be graded to their design elevations prior to construction of facilities. For archaeological sites that are eligible for listing on the NRHP that cannot be avoided, data recovery in accordance with an approved plan may be necessary prior to disturbance. Buildings will be constructed with exteriors of unobtrusive colors selected from an approved Federal or state land management agency list or as agreed upon with the regulatory agencies. Architectural drawings of the buildings and interior details will be developed, including the administration, rescue and emergency, warehouse, maintenance shop, assay building and guard house. The drawings will contain floor plans and elevations of the buildings in Section 17. Some of the same buildings are to be constructed in Section 16, as shown in **Figure 6**, but will be smaller than those in Section 17. The surface facilities in Section 16 are limited to head frame, hoist house, dewatering well pads and associated piping, ventilation shaft pads, non-ore development rock stockpiles, ore storage bays, sanitary septic system (as needed), and stormwater retention ponds.

3.2.2 Stockpiles

Stockpiles (NMAC 19.10.6.602.D.(15)(c)(i)) will contain various types of materials segregated during site preparation activities and mining operations. Separate stockpiles will include topsoil, sub-base rock, and non-ore development rock. The stockpile for each type of material is discussed in more detail below. Estimated volumes of the materials generated over the anticipated life of the mine by type and origin are presented in **Table 14**.

Table 14. Material Volumes

Material Type (cubic yards)	Section 16	Section 10	Section 9	Section 17	Section 15	Total
Production Shafts (50% swell)	23,595	--	--	3,534	--	27,129
Typical Vent Shafts (50% swell)	34,212	34,212	17,101	4,581	--	90,106
Non-Ore Development Rock (50% swell)	221,000	--	--	477,000	--	698,000
Topsoil (15% swell)	127,276	112,804	11,874	319,117	17,626	584,833
Sub-Base Rock (50% swell)	41,503	36,784	3,872	104,060	5,748	191,967

Topsoil, as defined in Section 3.1.1, is representative of the majority of soils that exist in the Project area and in New Mexico in general. Vegetative communities that exist in the Project area and New Mexico are adapted to these soil conditions. The topsoil stockpiles will be located within the operational facility footprint but out of the traffic patterns and will be placed in areas cleared of vegetation but not scraped of topsoil. Generally, stockpiles will be constructed with 3H:1V (horizontal (H): vertical (V)) slopes and at an estimated height of approximately 25 feet. The 3:1 slopes will accommodate ease of access to work on the piles and reduce erosion loss. The non-

ore development rock stockpiles in Section 17, which will be of shorter duration than the Section 16 piles, will be constructed with 3H:1V side slopes to a maximum projected height of 55 feet.

After archaeological inspection/clearance, grading of the disturbed areas will begin with the removal of vegetation located in the footprint of facilities before the topsoil is collected during the site grading process. Prior to the salvaging of topsoil, areas of salvage will be staked to allow equipment operators to salvage the available good quality topsoil to the depth that it is available. Many locations within the planned disturbance area (i.e., the 305 acres) have material that meets good topsoil criteria to a depth of more than 24 inches. These areas will be identified and staked in the field and material removed from these areas to the depth of suitable material or until the required volume is achieved.

Topsoil will be required for site reclamation to cover the total disturbance area of approximately 305 acres with 12 inches of topsoil. This volume is conservative, as some areas disturbed may be retained after completion of the Project to benefit the Post Mining Land Use of grazing, such as some roadways, water catchments, and channels.

The topsoil will be hauled and dumped on the stockpile area and then graded into layers and compacted with the weight of the equipment driving over it. When a stockpile is completed, it will be seeded with a seed mix (see **Table 24** in Section 7.7). Precipitation at the time of seeding will impact performance of the selected seed mix in the topsoil of the Project area. The vegetation will reduce erosion while providing microhabitat for beneficial soil organisms. Reclamation of stockpile areas will be conducted in accordance with Sections 6.1.1 and 6.1.9, with monitoring and revegetation success criteria described in Section 7.7.

Drainage swales will be constructed around the topsoil stockpiles where necessary to minimize stormwater run-on/runoff and erosion of the stockpiles. Wattles (fiber rolls) or other BMPs, including but not limited to earthen berms, will be installed below the stockpiles to minimize sediment mobilization during storm runoff events, in accordance with the SWPPP. Topsoil from areas not directly related to the mining facility, such as roads, ventilation/escape shaft pads, and the water treatment facility area, will be added to an existing stockpile or placed in localized areas if transport of the soil is impractical or small in quantity, such as may be the case with more remote ventilation shaft locations.

The excavated sub-base rock below the topsoil will be placed in a separate stockpile designated for sub-base rock in Sections 16 and 17. During initial construction activities, excavated rock will be used as fill or stockpiled for fill during reclamation. The topsoil will be removed and added to the topsoil stockpile before the sub-base rock is placed. The stockpile will be constructed with 3H:1V side slopes with a maximum height of 25 feet for topsoil piles and 55 feet for non-ore development rock stockpiles. The material will be placed in piles from haul trucks, and a dozer will push the material into flat layers. The movement of the dozer on top of the rock will crush and partially compact the material which improves the stability and reduces the volume. The dozer will slowly construct the side slopes and level the top. The stockpile surface may be sprayed with a soil stabilizer or water, if necessary, to control wind erosion. Drainage swales will be constructed around the stockpile to minimize stormwater run-on. Wattles or other BMPs (such as those depicted in **Figure 38**) will be installed below the stockpiles to minimize sediment mobilization during precipitation events, in accordance with the SWPPP.

Material generated during shaft construction will be placed in non-ore development rock stockpiles and returned to underground workings and shafts as needed for backfill and during reclamation. The material cuttings accumulated underground from vent shaft construction will be brought to the surface and hauled to the non-ore development rock stockpiles. The volume of

production shafts and vent shafts material are separated in **Table 14**, but the shaft material stockpiles in Sections 16 and 17 contain the total volumes. The topsoil at the ventilation shaft areas will be removed and added to the topsoil stockpile. The non-ore development rock stockpiles will be located as near the production shafts as possible to reduce the haulage and keep the material accessible for return to the shafts during reclamation. The side slopes will be 3H:1V, and the height will be limited to 55 feet to minimize the visual impact.

The material will be end-dumped from haul trucks and subsequently spread and leveled in lifts using a dozer to form uniform, compacted layers consistent with standard stockpile construction practices. The movement of the dozer on top of the rock will crush and partially compact the material which improves the stability and reduces the volume. The dozer will slowly construct the side slopes and level the top. The stockpile surface will be sprayed with a soil stabilizer if necessary to control wind erosion. Drainage swales will be constructed around the stockpile where necessary to minimize stormwater run-on. The stormwater runoff from the stockpile will be captured in a retention basin. The non-ore development rock from Sections 16 and 17 will initially be brought to the surface and placed in separate stockpiles. The designated stockpile areas will first be cleared of topsoil and lined to prevent seepage from the non-ore development rock into the ground surface. As the mine operations progress, material from the underground station and haulage levels of the mine (just below the shafts) will be added to the shaft material stockpile. This stockpile will have 3H:1V slopes and an estimated height of 55 feet. The material will be end-dumped from haul trucks and subsequently spread and leveled in lifts using a dozer to form uniform, compacted layers consistent with standard stockpile construction practices. The movement of the dozer on top of the rock will crush and partially compact the material which improves stability and reduces volume. The dozer will slowly construct the side slopes and level the top. The surface of the stockpile may be sprayed with a soil stabilizer or water, if necessary, to reduce wind erosion. Drainage swales will be constructed around the stockpile to prevent run-on erosion. Stormwater runoff from the stockpile will be diverted to a lined retention pond where sediment fines will be allowed to settle prior to being pumped to the WTP for treatment. Stormwater management features associated with stockpiles will incorporate applicable wildlife protection measures described in Section 7.3.2.

As discussed in Sections 3.1.7.3 and 5.2.3, the non-ore development rock will be returned to the mine as backfill material. As such, the non-ore stockpile will be removed over time.

3.2.3 Stormwater Management

As part of the evaluation of baseline conditions, a surface water hydrology study was conducted to present the concepts, methodology and calculations associated with the stormwater management proposed for the Project area and is included in **Appendix B**. The study results were used as a design tool to plan the location and size of the stormwater collection, conveyance, retention, and retention infrastructure, and erosion protection thereof.

Stormwater management infrastructure for the Project includes diversion channels, conveyance features, retention basins, and lined retention ponds associated with areas where contact with potentially impacted materials may occur. These facilities are intended to control runoff, minimize erosion, and manage stormwater that may contact operational areas. Retention ponds associated with potentially impacted water will be lined and managed in conjunction with the WTP, while retention basins intended for non-contact stormwater will allow controlled infiltrations and attenuation of runoff.

Their design and function are described in more detail in Section 7.3.6. Treatment and holding ponds will be constructed as part of the WTP discussed below.

3.2.4 Water Treatment

A WTP will be required to treat water generated during mine dewatering activities, collected runoff from ore and non-ore material stockpiles, and other contact water sources as described in Section 4.4. Mine dewatering wells, which are discussed in Section 3.1.3, are expected to be the primary consistent influent stream to the WTP during the initial dewatering phase, with other influent sources offering only minor, intermittent, and ephemeral contributions. After each initial mine dewatering phase, the mine dewatering wells will cease operation and ongoing groundwater intrusion will be conveyed in the mine workings and ultimately collected in the Section 17 and/or Section 16 mine shaft sumps and pumped to the WTP.

A preliminary concept-level design for the WTP is predicated largely upon (1) influent water quality from on-site and nearby well data for the aquifers of interest, (2) effluent water quality requirements for discharge as established by 40 CFR Part 440, Subpart C and relevant NM water quality standards, and (3) a volumetric throughput capacity of 6,000 gpm. Historic data indicates radon, radium, uranium, and molybdenum may be present at levels above applicable standards in the extracted groundwater with arsenic and selenium expected to be present in lower concentrations. These represent the primary constituents of concern (COC) requiring treatment prior to discharge. A general layout of the WTP is presented in **Figure 32**. The envisioned treatment sequence is depicted in **Figure 33**.

It begins with influent water reporting to an air stripping tower to liberate entrained radon, whereafter the water will report to a surge pond designed with a 24-hour hydraulic retention time. From this surge pond, the water will then be conducted to a ferric coprecipitation and lime softening treatment sequence, along with an additional process step to adjust the sodium absorption ratio (SAR). According to this sequence, sulfuric acid would be dosed to the influent water to lower the pH to a range of approximately 4 to 5 [S.U.]. This water would then report to a series of two reactor vessels (reactor set one) where ferric iron would be added as a coagulant to coprecipitate molybdenum and arsenic to anticipated effluent discharge standards, along with a small percentage of the influent selenium and uranium. Following the reactions that take place in the first reactor set, the water would be routed to a multimedia filtration (MMF) unit to remove suspended solids. In the detailed design phase, RHR may consider an alternative to the first MMF unit using a compact sand-ballasted clarifier unit for liquid/solids separation. Water exiting the MMF unit would then be pumped to the second reactor set in a series configuration where calcium salt, ferric and lime are added to induce precipitation of calcium carbonate and magnesium hydroxide in a lime softening process. Radium and uranium are well known to coprecipitate in lime softening processes. Following the reactions that take place in the second reactor set, the water would then report to a clarifier for liquid/solids separation followed by a second MMF unit to further remove suspended solids. Preliminary sampling data indicates the potential need for water exiting the second MMF unit to flow to a buried selenium biological reactor which is designed to have the ability to reduce selenate (which has an oxidation state of +6) to forms of selenium with lower oxidation states, primarily elemental selenium (0). In the detailed design phase, this need will be further investigated. Furthermore, RHR may consider an alternative selenium treatment step using ion exchange specifically targeting selenium, e.g., Selen-IX™ process. Water exiting the buried selenium biological reactor would then report to a SAR unit to adjust the ion ratios of the water prior to being discharged.

Sludges generated from the precipitation treatment process, as well as wastes from backwashes, and other accumulated residual streams necessary to service and maintain the treatment sequence are designed to be routed to onsite Geotubes or contained in double-lined cells that will be designed to capture filtrates. The filtrate will be pumped back to the WTP for treatment.

Once Geotube capacity has been reached, they will be relocated to a repository area that will be designed and permitted specifically for that purpose, according to regulatory guidance.

It is anticipated, but will be confirmed through sampling and analysis, that uranium, thorium, radium, as well as trace amounts of other radioactive materials in the U-238 decay series may be present in the materials recovered from the treatment process. In accordance with the provisions of this PoO-MORP, these materials will be collected, properly contained, and shipped offsite to an appropriately licensed facility for proper disposal.

As part of a similar, but alternative process to this sequence, RHR is also considering the use of ion exchange (IX) technology to remove uranium and radium as depicted in **Figure 34**.

As these radionuclides occur naturally in different ionic states, two different IX processes would be required to remove them from the influent streams. This alternative treatment step would involve the use of two sets of IX resin beds, whereby the uranium and radium in the passing water would sorb to the resin via their respective charge affinities: anionic IX resin for uranium, cationic IX resin for radium. Should RHR move forward with this alternative, under normal circumstances the IX resin loaded with radium would be disposed of as radioactive waste. However, RHR may elect to regenerate the uranium loaded IX resin for repeated use. Regeneration of IX resin is a simple process that involves a wash in diluted acid to strip the uranium from the resin as is routinely done at Energy Fuels' White Mesa Mill in compliance with current NRC licensure and regulations. While this process would be performed at either the mill or licensed offsite facility, it would nonetheless render the regenerated IX resin as by-product material as defined in Section 11, Paragraph e.(2) of the Atomic Energy Act of 1954 et seq. Regardless, upon review of the IX resin sorption performance specifications from multiple vendors, it is assumed that transportation of the fully loaded resin would be considered a Low Specific Activity (LSA) shipment in accordance with the requirements of 49 CFR 173 at theoretical concentrations and total activities of these radionuclides, and therefore would not warrant additional precautions other than those already in place for shipment of LSA material.

Residuals generated by the WTP, including dewatered sludge, spent treatment media, ion-exchange resins, and other treatment residuals, will be characterized as necessary to determine the applicable management and disposal requirements.

Treatment residuals requiring off-site management will be transported to an appropriately licensed or permitted facility authorized to receive the material.

No permanent on-site repository for radiological treatment residuals is proposed unless specifically identified, evaluated, authorized, and incorporated into a future approved revision of the MORP.

Final management pathways will be established based on analytical characterization, applicable regulatory requirements, facility licensing, and detailed WTP design.

Sanitary wastewater generated at surface facilities will be managed using on-site septic systems located in proximity to these facilities (primarily in Sections 16 and 17). No centralized wastewater treatment facility is proposed.

3.2.5 Proposed Discharge Pipeline

The preliminary treated water pipeline design specifies a 20-inch diameter PVC or HDPE pipe buried below ground in the right of way (ROW). New Mexico Department of Transportation personnel confirmed that the pipeline may be legally and practically placed in the existing disturbed right-of-way (ROW) parallel to State Highway Route 605. Under unrestricted gravity flow, velocities in the pipe would average 5 to 7 feet per second, and upwards of 10 feet per second in steeper areas near the mine site. As necessary and depending on final WTP facility configurations and elevations, flow control valves may be installed in order to reduce velocities, avoid supercritical flow conditions, and induce full pipe conditions at locations within the pipe. Based on the pipeline route chosen, the total length of the pipeline varies from 20 to 26 miles. The proposed discharge point would be in a recently re-engineered and widened stretch of the Rio San Jose streambed that runs through the Village of Milan (see BDR Supplement dated July 24, 2018).

Except for limited on-site operational uses, such as dust suppression, construction water, concrete preparation, equipment washing, and other incidental mine-related activities, groundwater removed during mine dewatering is proposed to be conveyed to the Water Treatment Plant (WTP), treated as necessary to comply with applicable discharge requirements, and discharged through the proposed pipeline to the Rio San Jose in accordance with the Project's NPDES permit. These limited on-site uses represent only a small portion of the overall mine water volume and do not alter the Project's proposed disposition of treated mine water. No alternative off-site discharge locations or routine disposal methods are proposed as part of this MORP.

RHR's mine permit application and Groundwater Discharge Permit application submitted to MMD and NMED, respectively, in 2009 proposed discharge of the treated effluent to San Mateo Creek. In response to agency concerns and comments on the Draft EIS, RHR developed an alternative discharge location to allay those concerns. The discharge will be into the Rio San Jose west of the Village of Milan. Downstream of the discharge point, the water will become available for a variety of users and create a year-round flow in the Rio San Jose, which could increase habitat and potentially benefit wildlife during the period of discharge.

At this time, RHR anticipates that it will operate the pipeline although it is possible that a separate utility company or association of water users may assume the operational responsibilities at some point in the future. Under the New Mexico Mine Dewatering Act (72-12A-1 to 72-12A-13 NMSA 1978), the water removed from the Mine is considered "produced water" and is not considered an appropriation of water; therefore, it does not convey a water right to the party withdrawing it, however, there is nothing in the Mine Dewatering Act that limits the use or uses of the produced water.

Treated water generated from mine dewatering may be beneficially reused to support Project operations, subject to regulatory approval and consistency with the New Mexico Mine Dewatering Act and any applicable permit conditions. The primary anticipated operational use of treated water is dust suppression on access roads, well pads, and other active work areas. Additional limited uses may include construction-related activities (e.g., soil conditioning or compaction), as appropriate and in compliance with approved plans. Specific reuse quantities will vary with dewatering rates, treatment system performance, seasonal conditions, and operational demand. Therefore, fixed volumes are not prescribed for the operation. Instead, treated water reuse will be:

- Managed adaptively based on actual water production and site needs;

- Subordinate to treatment and discharge requirements, verifying applicable water quality standards are met prior to any use; and
- Implemented only upon agency approval, and in a manner consistent with state and federal regulatory frameworks.
- If treated water is not needed for operational reuse at a given time, it will be managed in accordance with approved discharge and beneficial use provisions.

3.2.5.1 Operation, Inspection, and Contingency Measures

Following construction, mine water conveyance pipelines will be incorporated into the Project's routine inspection and preventative maintenance program. Pipeline inspections will be conducted by qualified operations personnel at frequencies established in the Project's operating procedures and applicable permit conditions. Inspections will include visual observation of aboveground pipeline segments, valves, fittings, supports, and other accessible appurtenances to identify evidence of leakage, corrosion, erosion, settlement, or mechanical damage.

If a leak, rupture, or other system malfunction is identified, affected pipeline segments will be isolated, pumping will be reduced or suspended as appropriate, and repairs will be completed before returning the system to service. Any released water will be contained, recovered where practicable, and managed in accordance with applicable federal and state regulatory requirements. Damaged areas will be repaired and stabilized as necessary to minimize impacts to soil, surface water, and groundwater resources.

Inspection findings, maintenance activities, corrective actions, and repairs will be documented as part of routine Project operational records. Additional inspection, monitoring, notification, and reporting requirements will be implemented in accordance with applicable permit conditions, including NPDES, NMED Discharge Plan, and other regulatory approvals, as applicable.

3.2.6 Surface Water Management Infrastructure

Surface water at Roca Honda Mine will be managed by infrastructure designed to accommodate the 100-year, 24-hour storm event precipitation total of 2.43 inches. Calculations and design criteria are detailed in the surface water management plan provided in **Appendix B**. Diversion structures (i.e., berms and channels) have been designed for locations in Sections 16 and 17 where stormwater flows could potentially impact the proposed surface facilities (NMAC 19.10.6.602.D.(15)(c)(iv)) or where required to separate contact (i.e., water originating from disturbed areas) and non-contact stormwater. The majority of runoff in Section 17 is currently diverted around the western side of the existing shaft site pad, however, hydraulic modeling of existing conditions for the 100-year 24-storm show that the existing pad would be inundated. Detailed results of the existing conditions flood model are provided in **Appendix B**. To avoid potential flooding of the site an engineered diversion channel would be constructed to intercept runoff from the natural channel to the north, route it along the western perimeter of the pad, and return it to the existing channel downstream of the pad.

Portions of the proposed surface facilities and associated stormwater management infrastructure are located adjacent to ephemeral drainages and floodplain areas. Project-specific geotechnical investigations have been completed to characterize the engineering properties of native soils and

bedrock, including soil classification, density, moisture characteristics, consolidation and swell potential, material strength, and durability. These investigations provide the basis for the detailed engineering of facility foundations, roadway embankments, culverts, diversion channels, and other engineered structures. During final design, site grading, engineered fill placement, foundation preparation, compaction requirements, and erosion and scour protection measures will be incorporated, as appropriate, to provide stable foundations under anticipated operational loading and the design storm event. Final foundation and earthwork design will be completed using accepted geotechnical engineering practices and the results of the Project-specific subsurface investigations.

The proposed road network connecting the various work areas on site crosses natural, ephemeral washes at several locations. Culverts or other appropriate drainage structures will be installed at these crossings, as needed, to maintain access during inclement weather. These crossings will be designed in accordance with the stormwater management criteria described in Section 3.4 and **Appendix B**. Erosion and sediment control measures, including water bars, rolling dips, appropriately sized culverts, rock armoring, energy dissipation features, ditch relief structures, erosion-control matting, wattles, sediment barriers, or other BMPs, will be incorporated as appropriate based on roadway gradients, contributing drainage area, soil conditions, and hydraulic analyses to maintain roadway stability, protect channel function, and minimize erosion and sediment transport.

Design criteria for less critical crossings (i.e., road crossings away from critical infrastructure and disturbed areas) may be refined in future studies. Retention basins are included for the topsoil stockpile, sub-base rock stockpile, and non-ore development rock stockpile to collect and manage contact water generated on site during the 100-year 24-hour storm. The disturbed surface facilities would be the only areas draining to each of these lined stormwater retention ponds. Portions of the diversion structures (channels and berms) and pond intakes may require stabilization measures such as rock armoring or erosion control mats to prevent erosion and verify zero discharge of contact water.

The diversion structures described above consist of engineered diversion channels and berms located immediately adjacent to Project facilities for the purpose of conveying stormwater around disturbed areas and maintaining separation of contact and non-contact water. These engineered diversion structures are distinct from existing natural ephemeral drainages and arroyos, which will generally remain in their existing alignment except where localized crossings, tie-ins, or stabilization measures are required. Outside the engineered diversion reaches, natural channels will continue to function as the primary drainage system. During operations, upstream and downstream channel stability will be maintained through routine inspections following significant storm events, implementation of the Project Stormwater Pollution Prevention Plan (SWPPP), maintenance of drainage crossings and erosion-control measures, timely repair of erosion, sediment removal where necessary, and installation of additional Best Management Practices (BMPs), as warranted, including localized rock armoring, erosion-control matting, grade stabilization, or other site-appropriate stabilization measures.

Warehouse storage areas for chemicals, fuels, explosives and supplies, parking areas for equipment and vehicles, the maintenance facility for vehicles, and electrical substations will be sited appropriately for the designated activities (NMAC 19.10.6.602 D.(15)(c)(x)), and power and water conveyance lines will be constructed to support mine operations.

Construction of the mine shafts is described in detail in Section 3.1.4. Ventilation shafts will be constructed as described in Section 3.1.5 for the required air ventilation and egress in the event of an emergency. The estimated disturbed area for vent shaft pads is approximately 6.3 acres in

total, with an additional 5.0 acres for roads to these sites. This disturbed area figure includes the vent shaft material stockpile and drilling recirculation mud pit associated with each shaft. Approximate dimensions of these areas are outlined by PLSS Section in **Table 6. Section 17 - Typical Surface Facilities and Structures** (See **Figure 8** Wattles or other BMPs (such as those depicted in **Figure 38**) will be installed around these areas to minimize sediment release from stormwater on the drill area. Each vent shaft disturbed area will include an approximate 100 x 250 feet mud pit for the shaft material, and a 100-foot radius drill pad. Wattles or other BMPs (such as those depicted in **Figure 38**) will be installed around these areas to minimize sediment release from stormwater on the drill area. Additionally, the areas around the ventilation holes and escape shafts will be graded and bermed to prevent stormwater run-on.

Roads and fences will be constructed to provide access to and security for surface facilities and associated utilities (NMAC 19.10.6.602.D.(15)(c)(xiii)). These features are indicated in **Figure 4**, **Figure 5**, **Figure 6**, **Figure 7**, and **Figure 8**. Roads are discussed in more detail in Sections 3.4.3 and 3.1.9. Total road surface disturbance within the Project area is estimated to be approximately 72.8 acres. This includes haul roads and roads to the vent shafts, dewatering wells, and drill holes. Separate exclusionary fences will be constructed around explosives facilities, electrical substations, and shafts. Fencing specifications are discussed in Section 3.2.1, Section 4.9.2 and Section 6.1.10.

The existing meteorological monitoring stations in Section 16 will be relocated prior to construction activities in the area where it is currently located. Additional stations (largely air monitoring stations) will be installed as necessary in and around the facility at locations to be determined in the future.

RHR has installed three monitoring wells around several of the impoundments in Section 16. One well was completed into the Gallup formation. Two wells were completed in the Dilco formation. Three monitoring wells in Section 17 consist of two wells in the Gallup formation and one in the existing shaft. These wells will be incorporated in a revised NMED Groundwater Discharge Permit Application. An additional three alluvial wells will be installed at locations specified in the approved Discharge Permit.

To confirm and refine the advancement of mining activities, RHR will need to conduct additional development or in-fill drilling. This activity will begin immediately upon approval of the mine permit application and likely occur in phases over the first two years following permit approvals. The development drilling will provide additional data for layout of underground mine workings. Surface disturbance associated with development drilling is temporary in nature as drill sites will be reclaimed on an ongoing basis, typically within weeks or months of plugging the drill holes. Drill sites will typically disturb about 0.3 acres per site including areas that may be compacted by equipment traffic but not bladed or stripped of vegetation. To minimize new disturbance, RHR has developed a drill plan that features overlapping drill pads and will drill multiple holes from individual pads wherever possible. Very little new road construction will be required as most sites can be accessed via existing two-track roads or overland travel. Also, most of the access will be in conjunction with other planned surface disturbance. **Figure 4**, **Figure 5**, **Figure 6**, **Figure 7**, and **Figure 8** show the number of proposed drill holes within each drill area boundary. Drilling will be performed pursuant to approvals obtained from the NMMD as part of the mine permitting process and hole plugging and abandonment will be done in accordance with OSE regulations.

The Preliminary Surface Water Management Plan (Appendix B) provides conceptual locations, preliminary hydraulic analyses, and preliminary sizing criteria for diversion channels, berms, retention ponds, and roadway drainage structures based on the current Project layout. Final engineering design of these features, including channel alignments, culvert sizing, erosion

protection, and transition details between engineered structures and natural drainages, will be completed during detailed design and incorporated into final construction plans prior to construction. The final designs will remain consistent with the performance objectives described in this MORP and applicable regulatory requirements.

Mud pits associated with ventilation shaft construction will be temporary features used to contain drilling fluids, cutting, and water generated during drilling activities. These pits will be constructed at or near the well or shaft locations and will be sized as appropriate for the anticipated drilling duration and fluid volumes. Fluids within the pits will be managed in accordance with applicable regulatory requirements, including the Project SWPPP and NMED requirements, and will not be discharged offsite. Upon completion of drilling activities, mud pits will be dewatered as needed, backfilled with suitable material, regraded to match surrounding topography, and reclaimed. These temporary mud pits are distinct from retention ponds and other stormwater management features, which are described in Section 3.4.

3.2.7 Power

Electrical power will be supplied to the Mine by existing power lines that transverse the Mine area. Backup generated power will be supplied by a 5 MW diesel power station located at the site. Backup power will be primarily for hoisting, dewatering, and ventilation.

A new transmission tap substation at or near Continental Divide Electric Cooperative's existing Gulf Minerals substation would reduce the transmission level voltage to 25 kV for distribution to the mine site and WTP at Section 17. The distribution line will be run overhead on poles along the existing right of way to the WTP site. The existing cable is not sized properly for the expected load, so it would need to be upgraded.

Power distribution on the mine site includes main shaft, dewatering pumps, ventilation shafts, and escape shafts. It will be distributed as 25 kV on overhead lines with taps and individual transformers for each location. The main shaft area will have two transformers. One transformer will reduce voltage from 25 kV to 4.16 kV to service the hoist and power for the mine. The other transformer will reduce the voltage from 4.16 kV to 480 V for the other surface loads around the shaft. Electrical power for ventilation systems, including surface-mounted fans, will be supplied via surface (overland) electrical distribution systems, with connections to site power infrastructure. Final power routing and equipment specifications will be determined during detailed design.

The site electrical utilization is three phase, 60 Hz, 480 V for all motors 200 hp or less; all motors larger than 200 hp will be 4,160 V. All low voltage motors will be started and controlled through standard Motor Control Centers (MCCs). Medium voltage (MV) motors will be started and controlled with their MV starters.

The feed to the Mine will be by 4,160 V power cables installed in the shaft feeding load centers with 4,160 V:600 V transformers. When the ventilation raise in Section 17 is in place, an additional line may be installed in the raise to provide a loop for power distribution. As an alternative, bore holes may be used as conduit for power lines to the underground mine to provide multiple feeds and to reduce the line loss with the shorter supply cables.

Electrical power will be required at the mobile load centers to provide power for jumbos and fans in the development and production areas. An electrical power supply to the main surface fan locations will also be required.

Power supplied to dewatering wells and ventilation fans, from existing pole structures, will be buried, as necessary, to minimize potential visual and wildlife impacts.

Surface grounding will be per National Electric Code (NEC) requirements and Institute of Electrical and Electronic Engineers (IEEE) 142 standards. Underground grounding will be per Mine Safety and Health Administration (MSHA) requirements.

As an alternative, RHR may consider connecting to the transmission lines to the northeast of the Project which are closer to the proposed mine.

The estimated power consumption for the underground mine, including ventilation, is 6.0 MW as presented in **Table 15**.

Table 15. Roca Honda Estimated Electrical Demand

Load Description	No. Units	Unit (hp)	Connected (hp)	Load Factor	Load (hp)	Power (kW)
Main Hoist	2	1,000	2,000	80%	1600	1200
Compressors	2	150	300	67%	201	150
Surface Pumps	1	700	700	90%	630	470
Heat Trace	5	30	150	100%	150	112
Shop Equipment	1	15	15	40%	6	4
Hot Water Heaters	1	25	25	70%	18	13
Lighting	1	15	15	90%	14	10
Office	1	20	20	40%	8	6
Surface Facility Demand						
Load Description	No. Units	Unit (hp)	Connected (hp)	Load Factor	Load (hp)	Power (kW)
Primary Ventilation Fans	14	191	2,680	90%	2,412	1,799
Lighting	1	10	10	90%	9	7
Shops	1	20	20	50%	10	7
Portable Welder	1	25	25	80%	20	15
Shaft Pumps	8	250	2,000	40%	800	597
Pumps	12	150	1,800	78%	1,404	1,047
Secondary Fans	8	50	400	100%	400	298
Underground Shops	2	100	200	23%	46	34
Longhole Drill	1	75	75	43%	32	24
Backfill/Aggregate Mixing Plant	2	100	200	12%	24	18
Cement Mixing Tank	2	50	100	12%	12	9
Electrohydraulic Drill Jumbo	8	75	600	24%	144	107
Rockbolter	8	75	600	24%	144	107

Shotcreter	1	75	75	24%	18	13
Lunch Rooms	2	20	40	8%	3	2
Underground Lighting	1	30	30	58%	17	13
Subtotal			12,080		8,121	6,062
Contingency			10%		10%	10%
Totals			13,288		8,866	6,668

3.2.8 Road Construction and Maintenance

The Project includes a combination of permanent and temporary roads constructed or utilized for different operational purposes. Road design standards vary depending on the intended use, anticipated traffic, duration of use, and operational requirements. Permanent roads are designed to support long-term mine operations and will remain in service for the life of the Project. Temporary roads are constructed only where necessary to support construction or developmental drilling activities and will be reclaimed when no longer needed. Existing roads and previously disturbed areas will be utilized to the maximum extent practicable to minimize new surface disturbance.

Temporary access roads associated with exploration activities, developmental drilling, dewatering wells, ventilation shafts, utility installation, environmental monitoring, and other temporary construction activities are included within the Project's maximum disturbance footprint unless specifically identified as existing roads or previously disturbed routes. Temporary access roads not retained for long-term operations or monitoring will be reclaimed in accordance with the reclamation provisions of this MORP following completion of their intended use.

3.2.8.1 Primary Haul Roads

Primary haul roads provide long-term access between the principal mine facilities located in Sections 16 and 17 and the project access point at New Mexico Highway 605. The primary haul route originates in Section 16, where it serves the production shaft, waste rock stockpile, backfill raise, dewatering well facilities, and other supporting mine infrastructure. From Section 16, the haul road continues through Section 17, providing access to the production shaft, water treatment plant (WTP), maintenance facilities, and other permanent operational infrastructure. The haul road then extends south through Section 20, where it follows the designated transportation and utility corridor to its intersection with NM-605.

These roads are designed to accommodate heavy truck traffic associated with mine construction, operations, delivery of backfill materials, transportation of supplies and equipment, and other operational activities. Haul roads will generally consist of graded aggregate surfaces with appropriate drainage features, roadside berms, and erosion control measures designed to provide safe, all-weather access while minimizing erosion and sediment transport.

Routine maintenance throughout the life of the mine will include periodic grading, drainage and culvert maintenance, dust suppression, vegetation management as necessary to maintain safe access, and localized surface repairs. Maintenance activities will be performed as needed to ensure continued safe operation while minimizing environmental impacts.

3.2.8.2 Mine Access Roads

Mine access roads serving ventilation shafts, dewatering wells, and other permanent project infrastructure may include both existing roads and new road segments where necessary to provide safe access. Where new roads are required, they are included within the Project disturbance footprint and will remain in service only for the duration necessary to support the associated facilities. Within Sections 9 and 10, the access road disturbance corridor will accommodate installation of a high-density polyethylene (HDPE) pipeline (approximately 10- to 18-inch diameter, as required by final design) to convey groundwater from the dewatering wells to the Water Treatment Plant (WTP) in Section 17. The access road corridor will also accommodate overhead electrical distribution lines, including individual transformer installations and service taps necessary to provide power to the ventilation shafts, dewatering wells, and associated facilities. Locating these utilities within the road disturbance corridor minimizes the need for additional surface disturbance by consolidating infrastructure within a common construction footprint.

3.2.8.3 Existing Forest Service Roads

Existing National Forest System roads, including portions of Forest Road 192 and other authorized access routes, will be utilized where appropriate to access project facilities located on National Forest System lands. Improvements, maintenance, or reconstruction of National Forest System roads will be limited to those specifically authorized by the U.S. Forest Service and necessary to safely accommodate anticipated project traffic. No primary ore haul traffic is proposed on National Forest System roads.

3.2.8.4 Temporary Drilling Access Roads

Temporary access roads required for exploration, geotechnical investigations, environmental monitoring, and dewatering well installation will utilize existing roads and previously disturbed corridors to the maximum extent practicable. Where new access is required, roads will be constructed only to the minimum width necessary for safe equipment access. Following completion of drilling activities, roads that are no longer needed for project operations or long-term monitoring will be reclaimed in accordance with the reclamation provisions of this MORP, while roads required for continued monitoring or facility maintenance will remain in service for the duration of their operational need.

Temporary access roads associated with development drilling will be reclaimed in accordance with Sections 6.0 and 7.7 of this MORP, including removal of temporary drainage structures where appropriate, regrading, installation of permanent drainage features as necessary to restore natural drainage, redistribution of salvaged topsoil where available, erosion control measures, and revegetation.

3.2.8.5 Road Use During Adverse Weather Conditions

During significant rain, snow, or other adverse weather events, road use will be minimized to the extent practicable to protect public safety, reduce roadway damage, and minimize sediment transport. Essential activities, including emergency response, personnel access, and other safety-related operations, may continue as necessary.

Following storm events, roads will be inspected by qualified personnel prior to resumption of normal operations, as appropriate for the severity of the event. Inspections will evaluate roadway

conditions, drainage features, culverts, erosion, washouts, debris accumulation, slope stability, and other conditions that could affect safe travel.

Any identified hazards will be addressed before unrestricted use resumes. Corrective actions may include temporary road closures, traffic restrictions, grading, removal of debris, drainage repairs, erosion control measures, placement of additional aggregate, or other maintenance activities necessary to restore safe operating conditions.

Where conditions warrant, administrative controls such as reduced speed limits, temporary traffic control measures, or restricted access will be implemented until road conditions are suitable for normal operations.

The Project road system consists of several categories of roads designed to support different phases of construction and mine operations. These include primary haul roads, permanent operational access roads serving ventilation shafts and dewatering wells, existing National Forest System roads utilized for Project access where authorized, and temporary access roads supporting development drilling and other short-duration construction activities. Because each road type serves a different operational purpose, design standards, maintenance requirements, duration of use, and reclamation requirements differ. Table 16 summarizes the principal characteristics, intended use, and reclamation approach for each road type proposed as part of the Project. Site-specific engineering design details, including final alignments, drainage features, culvert sizing, and other construction details, will be developed during final design and incorporated into the appropriate construction drawings and work plans prior to implementation.

Table 16 – Road Types

Road Type	Primary Use	Typical Users/Equipment	Typical Design Standard	Operational Duration	Reclamation
Primary Mine Access Road	Provides primary access between NM-605 and the mine facilities.	Employee vehicles, pickup trucks, water trucks, delivery trucks, maintenance vehicles, emergency response vehicles.	Engineered all-weather gravel road designed for regular mine traffic and maintenance.	Life of Project	Reclaimed during final mine closure.
Permanent Mine Access Roads	Provide access to permanent facilities (e.g., ventilation shafts, dewatering wells, monitoring locations).	Pickup trucks, maintenance vehicles, utility vehicles, emergency response vehicles.	Gravel access roads designed for maintenance and operational vehicles.	Life of associated facility	Reclaimed during final mine closure.
Developmental Drilling Access Routes	Provide temporary access to developmental drilling locations.	Drill rigs, water trucks, support pickups, geologists, utility vehicles.	Minimal clearing, grading, and drainage improvements necessary to safely conduct drilling operations.	Temporary	Reclaimed following completion of drilling unless retained for future operational use.

Temporary Construction Access Routes	Provide short-term access for construction or maintenance activities.	Construction equipment, cranes, excavators, dozers, dump trucks, maintenance vehicles.	Constructed only to the extent necessary for the intended activity.	Temporary	Reclaimed when no longer required.
Existing Roads	Utilize existing Forest Service roads and previously disturbed roads where practicable.	Vehicles appropriate for the authorized activity, including pickups, maintenance vehicles, drill support vehicles, and emergency response vehicles.	Existing road standards with localized improvements only where necessary.	Existing	Existing roads remain in service unless temporary improvements require reclamation.

Temporary developmental drilling access routes and associated drill pads will be reclaimed following completion of drilling activities unless retained for future operational use.

3.3 Wildlife Impacts Contingency Plan -19.10.6 602 D.(15)(d)

(d) A contingency plan to mitigate impacts to wildlife when there has been an emergency or accidental discharge of toxic substances that may impact wildlife.

The Wildlife Impacts Contingency Plan (WICP) (**Appendix C**) establishes enforceable procedures, response protocols, and mitigation measures designed to prevent, minimize, and remediate adverse impacts to wildlife resources resulting from unplanned or emergency releases associated with the Roca Honda Mine Project and is based on the findings from the 2013 BDR Section 5 – Wildlife and BDR Addendum 1 - Appendix A-1: Biological Survey of Proposed Section 17 Expansion Area (Marron and Associates, 2018). The plan addresses a full spectrum of potential incident types, including but not limited to accidental discharges of toxic or hazardous substances, dewatering pipeline failures, containment breaches from lined or unlined impoundments, overtopping events, and releases of hydrocarbons or chemical reagents used in mining and water treatment operations.

The applicability of this WICP extends across the entire permitted mine footprint, including Sections 9, 10, 16, and 17, as well as associated infrastructure such as process water conveyance systems, discharge pipelines, access and haul roads, lined pond systems, stormwater controls, and disturbed or operational areas where wildlife exposure pathways may occur.

This plan is structured to meet or exceed relevant federal and state regulatory requirements governing wildlife protection and environmental response. Specifically, it is designed to comply with the wildlife contingency planning requirements under NMAC 19.10.6.602.D(15)(d), the spill prevention and control provisions of 40 CFR Part 112 (SPCC), and the stormwater discharge management requirements of 40 CFR Part 122 (SWPPP). In addition, the WICP supports compliance with the National Environmental Policy Act (NEPA), including the protection of biological resources as evaluated in the Project Environmental Impact Statement (EIS), and aligns with the U.S. Forest Service Land and Resource Management Plan (LRMP) for the Cibola National Forest, including provisions for Management Indicator Species.

The plan further incorporates protections required under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA), ensuring that both common and special-status species are afforded appropriate safeguards. Collectively, this framework ensures that

wildlife protection measures are integrated into phases of Project operation and incident response.

3.4 Sediment Control -19.10.6 602 D.(15)(e)

(e) A description of measures which will be undertaken to reduce sedimentation from the Project area and a plan for the monitoring of non-point source sediment pollution from the disturbed area.

Development of the mine surface facilities and associated infrastructure support, as well as the actual mining activities, will disturb portions of the Project area making them more vulnerable to erosion. Therefore, surface runoff control measures will be implemented within the RHR Project area to contain non-point sources of suspended solids and other potential pollutants.

BMPs will be used to stabilize the site and prevent activities within the Project area from contributing suspended solids or other potential pollutants to off-site areas in excess of regulatory standards. As previously mentioned, a SWPPP will be developed and implemented for the facility. The following types of BMPs will be designed, constructed and maintained at the Roca Honda Mine in accordance with the requirements of the New Mexico Department of Transportation (NMDOT, 2009) and the U.S. Environmental Protection Agency (USEPA, 2009). Typical erosion control devices may include, but not be limited to, the following:

- Runoff control devices (swales, ditches, wattles);
- Energy dissipaters (check dams, riprap, etc.);
- Slope drains;
- Excavated sediment traps;
- Retention ponds;
- Diversion channels (overland flow and stream);
- Retention basins;
- Stockpile slope construction; and
- Stockpile soil cover and vegetation.

Controls will be inspected and maintained as designed, as described in Section 7.1.2.

3.4.1 Surface Facilities

The proposed site grading is shown in **Figure 4, Figure 5, Figure 6, Figure 7, and Figure 8**, while drainage plans for the mine facilities are shown in the Surface Water Management Plan provided in **Appendix B**. The installation of site drainage and erosion control BMPs for these facilities will generally proceed according to the following sequence.

Prior to starting preparation of areas for surface facilities' construction, coverage of the area by previous archaeological surveys will be confirmed against the site archaeological survey by a qualified archaeologist and inspected in the field. When the location is "cleared" for cultural resource parameters, the topsoil will be removed and stockpiled. Note that most of the facility area in Section 17 has already been stripped of topsoil and leveled by previous operators and current ranching activity, so very little material is available for salvage.

Stockpile locations are indicated on **Figure 4, Figure 5, Figure 6, Figure 7, and Figure 8**. Separate stockpiles will be constructed for:

- Topsoil
- Sub-base rock
- Non-ore development rock

Stockpile slopes will be constructed at a slope ratio of 3H:1V. Diversion ditches will be constructed around the base of the stockpiles and terminated at excavated sediment traps with rock filter per NMDOT Standard 603-01-5/7 (NMDOT 2009). Wattles or other similar erosion control BMPs (such as those depicted in **Figure 38**) will be installed below the stockpiles to minimize material movement. Stormwater runoff from stockpiles disturbance areas will be captured in lined retention ponds constructed with sediment settling structures that will be cleaned as needed.

Topsoil and sub-base rock materials are non-mineralized therefore those stockpiles, disturbance areas and associated retention pond areas will not be lined. Non-ore development rock stockpiles may contain materials with potentially elevated concentrations of constituents of concern; therefore, retention ponds associated with those stockpiles will be lined. Lined retention ponds will be constructed with liner systems and may include the liner bedding, leak detection systems, synthetic liners, anchor trenches, and berms. Disposal of this water will be accomplished by pumping to the WTP.

To further minimize mass movement of sediments from the site, the stockpiles will be compacted in layers as they are constructed. The stockpile surfaces will be sprayed with a soil stabilizer, if necessary, to control wind erosion.

Following installation of runoff control measures, construction of buildings and other site structures will commence. After construction is complete the disturbed areas not needed for on-going operations will be seeded or treated with tackifiers to reduce erosion by rain and wind.

No permanent storage or stockpiling of waste rock, drill cuttings, or excavated materials is proposed on National Forest System lands. Temporary storage of topsoil or suitable native material may occur within approved disturbance areas to facilitate construction and reclamation activities.

3.4.2 Structures

Surface facilities and structures will be constructed within the Roca Honda permit area to support the underground mining efforts. Most of these facilities and structures will be located on Sections 16 and 17 with minimal structures located on Sections 9 and 10 (see **Figures 4 through 6**). The size and description of these facilities and structures are summarized for Sections 16, 10, 17, and 9 in **Table 6**, **Table 7**, **Table 8**, and **Table 9**. In addition, **Appendix A** contains a limited set of preliminary design drawings. Final locations, sizes, engineering designs, geotechnical information, and supporting calculations will be provided as the mine design progresses.

3.4.3 Roadways, Drill Pads, Vent Shafts and Utility Transmission Corridors

As with the previously described installation of BMPs, prior to constructing new roadways, drill pads, vent shafts, and utility corridors, or improving existing roadways, RHR will verify that there are no impacts to archaeological sites eligible for listing on the NRHP and will implement measures to avoid or minimize impacts to other environmental resources, including wildlife and culturally sensitive landscapes such as the Mount Taylor Traditional Cultural Property. Isolated objects or other culturally significant items discovered during construction will be evaluated for

recovery potential by the on-site archaeology monitor. Where appropriate, topsoil will be removed and stockpiled for future use and reclamation.

Access roadways, drill pads, and utility corridors will be constructed at or near existing grade, where possible. Some cut and/or fill for roads and vent shafts may be necessary. Drill pads will conform to existing topography and require minimal preparation for drilling. Typically, existing two track roads or trails will be used to access drill sites while improved roads will be necessary for some vent shaft locations as shown in **Figure 4, Figure 5, Figure 6, Figure 7, and Figure 8**. Detailed plan and profile drawings for the roads will be included in the final mine design drawings. Multiple culvert crossings will be constructed in the Project area for access and haul roads. The locations and sizes of the culverts are presented in the Surface Water Management Plan (**Appendix B**).

Currently, hydrology structures are designed to withstand the 100-year rain event. Diversion structures, and culverts, are designed to safely convey a 100-year, 24-hour precipitation event. As more advanced mine design takes place, the surface water management strategy will be refined to accommodate the more detailed information available. Sediment traps will be used immediately upstream of locations where roadside swales discharge to existing drainage channels. Swales and sediment traps will be checked and maintained following runoff events. Maintenance will include restoring roadside swale damage to their original constructed condition and repairing slope erosion damage. In some cases, it may be necessary to install water bars or similar features across roads to decrease erosion potential.

3.4.4 Water Treatment Plant

The WTP will be located in Section 17. Site drainage and erosion control BMPs will generally be installed at the site of construction of the WTP in the following sequence, after archaeological clearance has been confirmed:

- Install the perimeter runoff control swales.
- Strip topsoil and store in the designated location. Topsoil slopes will be at a ratio of 3H:1V. Install diversion ditch around base of the stockpile and terminate at an excavated sediment trap with rock filter per NMDOT Standard 603-01-5/7 (NMDOT 2009). Install wattles below the stockpile. Divert runoff to nearest arroyo.
- Grade site to finish grade. Cut slopes will be 2H:1V and fill slopes will be 3H:1V. Place topsoil in the topsoil stockpile and excavated rock in the sub-base rock stockpile, both located in Section 17. These stockpiles will have 3H:1V side slopes.
- Install runoff control swale and excavated sediment trap at toe of cut slopes.
- Following installation of runoff control measures, begin construction of the WTP, associated ponds and pipeline. The ponds will be designed and constructed with appropriate freeboard.

3.4.5 Non-Point Source Sediment Monitoring Plan

RHR will implement a stormwater and sediment monitoring program consistent with NMAC 20.6.4 to protect State waters and comply with anti-degradation requirements. Monitoring will occur at retention basin outlets and downstream receiving drainages in Sections 16 and 17, with upstream reference locations used where practicable. Sampling will be conducted during and/or following qualifying storm events (generally ≥ 0.25 inches in 24 hours), as conditions allow, and will include parameters such as total suspended solids (TSS), turbidity, pH, specific conductance/TDS, major

ions, nutrients, and visual indicators (e.g., sheen, color, sediment transport). Additional analytes (e.g., metals or radionuclides) will be included as warranted by site conditions.

Monitoring results will be compared to applicable NMAC 20.6.4 standards, baseline conditions, and BMP performance expectations. Exceedances of standards, measurable increases above background attributable to site activities, or evidence of BMP failure will trigger corrective actions, which may include repair or enhancement of control measures, modification of drainage controls, increased monitoring, or adjustment of site activities. Monitoring results will be documented and reported in accordance with NMED requirements and made available to the U.S. Forest Service upon request.

3.4.5.1 Monitoring Locations

Monitoring will be conducted at representative locations where stormwater may leave disturbed areas, including:

- Outlets of retention basins in Sections 16 and 17
- Downstream receiving drainages immediately below discharge points
- Background/reference locations upstream of Project influence (where flow conditions allow)

Monitoring locations are shown on **Figures 4 through 8** and described in **Appendix B** (Hydrology).

3.4.5.2 Monitoring Parameters

Monitoring will be designed to evaluate compliance with narrative and numeric standards in NMAC 20.6.4.13, including protection of designated uses. Parameters will include, as applicable:

- Total Suspended Solids (TSS)
- Turbidity
- Settleable solids
- pH
- Specific conductance / Total Dissolved Solids (TDS)
- Major cations and anions
- Oil and grease (visual and analytical where warranted)
- Nutrients (e.g., nitrate, ammonia)
- Dissolved oxygen (where practicable)
- Temperature
- Metals and radionuclides (as appropriate to site conditions and disturbance areas)

Visual inspections will also document color, odor, sheen, sediment deposition, and evidence of erosion or transport.

3.4.5.3 Adaptive Management and Corrective Actions

Monitoring results will be evaluated against applicable permit requirements, NMAC 20.6.4 surface water quality standards, baseline conditions, and the performance objectives of the Project's stormwater Best Management Practices (BMPs). Monitoring results indicating BMP deficiencies, exceedances of applicable water quality standards, measurable Project-related

degradation relative to baseline conditions, or other evidence that stormwater controls are not performing as intended will initiate an evaluation of the affected area.

Corrective actions may include inspection and repair of erosion and sediment control measures, removal of accumulated sediment, installation or modification of additional BMPs, stabilization of disturbed areas, modification of construction sequencing or operational practices, increased monitoring frequency, temporary suspension of the activity contributing to the observed condition where necessary to implement corrective measures, and notification of the appropriate regulatory agencies as required by applicable permits.

Monitoring results, inspections, corrective actions, and follow-up evaluations will be documented as part of the Project's environmental compliance records and incorporated into adaptive management of stormwater controls throughout construction, operations, and reclamation.

3.4.6 Excavated Materials Management

Management of the excavated material generated during mining operations will generally be addressed in the following ways. Shaft material will be stockpiled separately in a designated area. Non-mineralized material is excavated outside of the mineralized zone to gain access to the ore. These excavations include haulage ways, drifts, raises and other mine development passages that are designed and located to minimize the possibility of containing mineralization. Some of these materials will be hoisted to the surface and stockpiled, particularly in the early development of the mine as discussed in Section 3.1.4. As the mine develops and matures, this type of material produced in the underground excavations will be managed so that it will be excavated and immediately placed underground as mine backfill as described in Section 3.1.7.3. As a result, these materials will not reach the surface of the mine site. When mining has been completed, RHR anticipates that the stockpiled material temporarily stored on the surface will have been re-deposited in the mine and the shafts as part of the final reclamation, pending the results of materials characterization. Some barren rock may be used in achieving design topographic elevations or grades during final reclamation.

The majority of the excavated materials, i.e., the ore brought to the surface of the mine, will be transported off-site for processing. Some sub-grade mineralized material, approximately 221,000 cubic yards in Section 16 and 477,000 cubic yards in Section 17, will be temporarily stockpiled at the mine surface in non-ore development rock stockpiles. Most of this material will be returned to the mine as backfill (see Section 3.1.7.3) though some may be transported to the mill. Production of this material will be minimized to the extent possible as handling this material results in increased mining costs.

3.5 Equipment

3.5.1 Surface Equipment

Surface equipment will be used for site preparation, road construction and maintenance, material handling, stockpile management, water management, and general facility support. Typical equipment includes earthmoving machinery, haul trucks, water trucks for dust suppression, and support vehicles.

This equipment will be used to:

- Construct and maintain access and haul roads;
- Develop and manage stockpiles (e.g., topsoil, subsoil, and non-ore material);
- Support installation of surface facilities and infrastructure;
- Manage stormwater controls and site drainage features; and
- Apply water for dust suppression during construction and operations.

Surface equipment will operate within designated disturbance areas and will be maintained in accordance with manufacturer specifications to support safe and efficient operation.

Actual noise levels will vary depending on equipment specifications, load conditions (particularly for highway trucks), and operating practices.

Noise generated by Project activities will attenuate with distance due to geometric spreading, atmospheric absorption, and interaction with terrain and vegetation. As a general rule, sound levels decrease by approximately 6 dBA for each doubling of distance from a point source under free-field conditions. For example, a source generating 90 dBA at 50 feet would attenuate to approximately:

- ~84 dBA at 100 feet
- ~78 dBA at 200 feet
- ~72 dBA at 400 feet
- ~66 dBA at 800 feet
- ~60 dBA at approximately 1,600 feet

Based on this relationship, and accounting for additional attenuation from terrain shielding and vegetation, sound levels are expected to decrease to near-background conditions within approximately 500 to 2,000 feet from active work areas, depending on site-specific conditions. This approach is consistent with general noise analysis methodologies described in guidance from the U.S. Environmental Protection Agency (EPA).

3.5.2 Noise Mitigation Measures

RHR will implement the following measures to minimize noise impacts:

- **Equipment Controls:** Equipment will be maintained in good working order and equipped with manufacturer-recommended mufflers and noise suppression systems.
- **Ventilation Fan Mitigation:** Ventilation fans (typically operating within industrial noise ranges of approximately 75–95 dBA at the source) will incorporate shrouds, if necessary
- **Siting:** Stationary noise sources (e.g., generators, compressors, batch plant) will be located to take advantage of natural topographic screening and maximize distance from sensitive receptors, including the Mt. Taylor TCP.
- **Operational Practices:** Activities will be managed to minimize unnecessary idling and avoid excessive noise generation where practicable.
- **Adaptive Management:** If noise-related concerns are identified, additional measures (e.g., temporary barriers, operational adjustments) will be implemented in coordination with the U.S. Forest Service.

Horsepower ranges are representative of typical industry-standard equipment that may be used during construction and operations. Actual equipment specifications may vary depending on

contractor selection and operational needs; however, equipment will remain within these general ranges.

Table 16 provides a summary of anticipated surface equipment and typical noise levels during operation.

Table 17. Surface Equipment

Equipment Type	Quantity	Typical Noise Level Range (A-weighted decibels -dBA)	Typical Horsepower Range (hp)	Primary Use
Generator Sets	2-4	75–90	100–500 (depending on kW rating)	Provide emergency, standby, prime, and continuous power to the mine operations. Anticipated to be used on an as needed basis.
Air Compressors	5-8	80–95	100–350	Used to power tools/equipment.
Switchgears	2-3	60–75	N/A (electrical equipment)	Provides single standby/load management or multi-unit utility paralleling when integrated with the generator set at the facility. Daily use is anticipated.
Bulldozers (various sizes)	3-4	85–95	150–400	Road construction and cut-and-fill leveling for large areas. Daily use is anticipated during site preparation and construction
Graders (various sizes)	2-3	80–90	150–300	Leveling large areas and roads. Daily use anticipated during site preparation and construction.
Excavators (wheel and track)	2-3	80–90	150–500 (approx. 20–80 tons)	Digging, material handling, lifting heavy objects, general grading and landscaping. Daily use anticipated during site preparation
Scrapers	3-4	85–95	250–600	Primarily used for earth-moving and cut-and-fill operations. Anticipated to be used on an as needed basis.
Drill Rigs	2-3	85–100	200–600	Constructing wells, development drilling, and vent shafts
Hydraulic Hammers	1-2	90–105	100–300 (carrier machine dependent)	Breaking rock or concrete. Anticipated to be used on an as needed basis
Backhoes	2-3	75–85	70–150	Digging and backfilling. Anticipated to be used on an as needed basis
Vibratory Rollers	1-2	80–90	100–200	Compacting materials such as road base. Anticipated to be used on an as needed basis
Cranes	1-2	75–85	150–400	Constructing or lifting heavy objects such as a head frame. Anticipated to be used on an as needed basis
Loaders (various sizes)	2-3	80–90	150–400	Load material (demolition debris, dirt, gravel, raw minerals, rock, etc.) into or onto another type of machinery (e.g. dump truck,

Equipment Type	Quantity	Typical Noise Level Range (A-weighted decibels -dBA)	Typical Horsepower Range (hp)	Primary Use
				conveyor belt, etc.). Daily use is anticipated
Forklifts	2-3	70–85	50–150	Lift and transport materials. Daily use is anticipated.
Dump Trucks	2-3	80–90	200–500	Move and stockpile excavated material. Daily use is anticipated
Haul Trucks (semi-trucks w/trailers)	Variable (third-party haul fleet)	85–100	400–600	Transport ore from the mine site to the mill. Over the highway semi truck and trailer type.
Concrete Batch Plant	1	75-90	100–300 (combined systems)	Mixing concrete to be used at various locations. Anticipated to be used on an as needed basis
Water trucks (4,000 gallon typically)	3-4	80–90	200–400	Drilling support and to haul water for dust suppression on roads and disturbed areas. Daily use anticipated
Pickup Trucks	4-5	65–75	150–300	Used for various support activities. Daily use anticipated
Bobcats	2-3	75–85	50–100	Mine clean up for small jobs
HDPE Pipe Fusing Machines	2-3	70-85	30–100	Water supply/dewatering pipe construction/maintenance. Includes associated hydraulic power units and small generators, where used.
Fuel Trucks	2	75–85	200–400	Fuel haul around mine site to equipment, as needed
Vans (for crews)	2-3	65–75	150–250	Crew transportation
Ambulance	1	70–80	250–350	Emergency Response/Rescue
Fire Truck	1	80–90	300–600	Fire fighting

3.5.3 Underground Equipment

Underground mining will utilize specialized equipment appropriate for room-and-pillar and drift-and-fill mining methods. Equipment will support drilling, blasting, material handling, ground support installation, and haulage of mineralized material to the surface.

Typical underground equipment includes drill rigs, loaders, haul trucks, and support vehicles.

This equipment will be used to:

- Advance underground workings through drilling and blasting;
- Load and transport mineralized material and waste rock;
- Install ground support systems as required for safety and stability; and
- Support ventilation, dewatering, and general underground operations.

Underground equipment will be operated in accordance with applicable safety regulations and maintained to support reliable performance under underground conditions. **Table 17** provides a summary of anticipated underground equipment.

Table 18. Underground Equipment

ROCA HONDA MINE: Plan of Operations and Mine Operations and Reclamation Plan (PoO-MORP)

Mobile Equipment	Horsepower (hp)	Quantity	Total hp
Development			
Jumbo – 1 boom	80	4	320
LHD 3-yd	130	4	520
Materials Handler with man-basket	101	2	202
Roofbolter	80	4	320
Shotcreter	148	2	296
Remix Transporter	200	2	400
Stoping			
Jumbo – 1 boom	80	5	400
LHD 1.75-yd	75	3	225
LHD 3-yd	130	2	260
Roofbolter	80	5	400
LHD 1.75-yd Backfill Rammer	75	2	150
LHD 3-yd Backfill Rammer	130	2	260
Materials Handler with man-basket	101	3	303
Miscellaneous			
Truck 16-ton ejector box (development and stoping)	210	8	1,680
LHD 3 yd (shaft station transfer to skip pocket)	130	2	260
Jumbo – 1 boom (spare)	80	1	80
LHD 3-yd (spare)	130	1	130
LHD 1.75-yd Backfill Rammer (spare)	75	1	75
LHD 3-yd Backfill Rammer (spare)	130	1	130
Roofbolter (spare)	80	1	80
Truck 16-ton ejector box (spare)	210	1	210
U/G Longhole Drill	73	2	146
Materials Handler with boom	101	2	202
Boom Truck	148	2	296
Caterpillar 272C (Skid Steer Loader)	90	2	180
Maintenance Utility Vehicle	148	2	296
Pump Crew Utility Vehicle	148	1	148
Electrical Utility Vehicle	74	2	148
Supervision and General Utility Vehicle	22	3	66
Engineering/Geology Utility Vehicle	22	3	66
Surveyor Utility Vehicle	74	1	74
Personnel Transport Vehicle	148	2	296
Grader	110	1	110
Total Mobile Equipment	--	-79	8,729

4.0 Environmental Protection Measures

Environmental Protection Measures (EPMs) for the Project have been developed in accordance with USFS regulations under 36 CFR 228, Subpart A. These measures are intended to minimize potential impacts to air quality, water resources, biological resources, cultural resources, and human health throughout all phases of the Project.

4.1 Air Quality

Air quality within a region is evaluated against the National Ambient Air Quality Standards (NAAQS) for criteria pollutants established under the Clean Air Act (42 United States Code 7409). Areas are designated as nonattainment when monitored pollutant concentrations exceed applicable NAAQS. The Project is located in an area that is in attainment for criteria pollutants and is not currently subject to any nonattainment designations. In addition, the Project is not located within or in proximity to any Class I areas, which are afforded special protection under the Clean Air Act. Accordingly, the Project is not expected to be subject to Class I area air quality analyses or related regulatory requirements.

Notwithstanding the above, the Project remains subject to applicable federal and state air quality regulations, including the U.S. Environmental Protection Agency's National Emission Standards for Hazardous Air Pollutants (NESHAP) and the State of New Mexico air quality regulatory requirements, as administered by the New Mexico Environment Department.

Air quality protection for the Project is addressed through an integrated set of design features, operational controls, monitoring programs, and regulatory compliance measures described throughout this document. In addition to the specific measures outlined in this section, relevant air quality components are described in Section 3.1 (Mine Development and Construction Activities), Section 3.2 (Surface Facilities and Infrastructure), Section 3.4 (Sediment Control and Dust Suppression Practices); and Section 7.1 (Best Management Practices). These sections collectively describe source control measures (e.g., dust suppression and material handling), engineered systems (e.g., mine ventilation), operational controls (e.g., traffic management and equipment maintenance), and monitoring approaches to minimize emissions and protect air quality throughout the life of the Project.

Air quality compliance, including evaluation of applicable permitting requirements (e.g., Prevention of Significant Deterioration [PSD]) and radionuclide emissions standards under the NESHAP program, will be addressed through coordination with applicable regulatory agencies. Air dispersion modeling (e.g., AERMOD or equivalent EPA-approved models) will be conducted, as required, to evaluate potential emissions and demonstrate compliance with applicable air quality standards.

Ventilation shafts and associated air sampling locations will also serve as key monitoring and compliance points for evaluating emissions and operational air quality performance, including support for applicable regulatory requirements.

The following environmental protection measures have been developed to minimize emissions and to comply with applicable federal and state regulatory requirements for the Project's underground mining operations and associated surface facilities:

4.1.1 Underground Mining with Backfill

Mining will be conducted underground with the use of cemented backfill to fill mined stopes, as needed. This approach reduces the need for large surface waste rock storage facilities and minimizes the potential for fugitive dust emissions associated with such features. Waste rock will be utilized as backfill, where necessary, within underground mine workings to reduce subsurface void space, limit advective airflow pathways, and promote radon attenuation, thereby minimizing the potential for radon migration to the surface and supporting compliance with applicable air quality protection requirements.

4.1.2 Surface Material Handling and Storage Design

Surface facilities, including ore bins and material handling areas, will be designed and managed to minimize fugitive emissions. Stockpiles will be compacted, contoured, and, where appropriate, stabilized or covered to reduce wind erosion and dust generation.

4.1.3 Facility Siting and Haul Distance Minimization

Surface infrastructure, including stockpiles and ore bins, will be sited to minimize haul distances and associated fuel use. This reduces emissions from haul trucks operating on access and haul roads.

4.1.4 Transport Controls and Trip Reduction

Material transport will incorporate best management practices, including covered or enclosed hauling where appropriate. Employee commuting will be minimized through carpooling, bussing, and operational planning to reduce vehicle trips and associated emissions.

4.1.5 Air Emissions Tracking and Compliance

The Project will implement air emissions monitoring and tracking programs to verify compliance with applicable federal and state regulations, including the Clean Air Act, National Ambient Air Quality Standards (NAAQS), NMED air permitting requirements, and applicable provisions of the National Emission Standards for Hazardous Air Pollutants (NESHAP), including radon emission requirements specific to uranium operations. Monitoring will support compliance verification, reporting, and continuous improvement.

4.1.6 Engineered Emission Controls

Engineering controls will be implemented at emission sources such as ore/waste rock handling and ventilation exhaust points. Ventilation shafts will be designed to comply with applicable radionuclide emission standards. Equipment and engines will meet applicable federal standards, including New Source Performance Standards (NSPS) and NESHAP requirements.

4.1.7 Fugitive Dust Management

Although mining occurs underground, fugitive dust may be generated from surface activities such as vehicle travel on haul roads, material handling, and stockpiling. The Project will implement a fugitive dust control plan that includes:

- Monitoring weather forecasts (e.g., from the National Weather Service) and limiting or modifying activities during high wind events (e.g., gusts exceeding 25 mph), where practicable.
- Application of water or approved dust suppressants to access roads, haul roads, and disturbed areas using water trucks or equivalent type of equipment.
- Maintaining adequate dust suppression capacity, including backup systems.
- Assigning trained personnel responsibility for dust control implementation and compliance.
- Curtailing or ceasing activities if visible emissions cannot be effectively controlled.

4.1.8 Speed Limit Enforcement

Vehicle speeds on access roads and haul roads will be controlled through signage, operational policies, and monitoring systems to reduce dust entrainment.

4.1.9 Road Design and Maintenance

Primary access roads and high-use haul roads will be constructed and maintained with appropriate surfacing (e.g., gravel, soil stabilizers, or other treatments) to minimize dust generation and vehicle wear.

4.1.10 Employee Training

Personnel will receive training on air quality requirements, including dust control practices and regulatory compliance obligations under federal and New Mexico regulations. Refresher training will be conducted annually.

4.1.11 Radon and Radiological Emission Controls

Operational controls will be implemented to minimize radon flux and the release of fugitive dust containing radioactive particulates from underground workings, surface facilities, and the Water Treatment Plant (WTP). These controls are designed to confirm compliance with applicable air quality regulations (20.2 NMAC), federal radionuclide emission standards (40 CFR Part 61, Subpart B, as applicable), and performance objectives under 10 CFR Part 40 Appendix A.

4.1.11.1 Radon Flux Control – Surface and Material Handling

Radon emissions and fugitive dust from uranium-bearing materials (including ore and low-grade stockpiles) will be controlled through a combination of design and operational measures, including:

- **Moisture conditioning and surface stabilization:** Application of water sprays, hygroscopic agents, or other conditioning methods to maintain sufficient moisture content and reduce radon emanation and dust generation.
- **Cover systems and material management:** Use of interim covers (e.g., soil, geomembrane, or other low-permeability materials) on inactive or long-duration stockpiles to reduce radon flux consistent with 10 CFR Part 40 Appendix A (Criterion 6).

- **Minimization of exposed surface area: Active** management of stockpile geometry and material throughput to limit the duration and extent of exposed uranium-bearing materials (ore).
- **Over-the-road haul truck loading controls:** Loading of uranium-bearing materials into over-the-road haul trucks will be conducted at designated loadout areas designed to minimize fugitive dust and radon release. Controls will include:
 - Pre-conditioning of material moisture content to limit dust generation while maintaining material handling efficiency;
 - Wind mitigation measures, such as windbreaks or strategic orientation of loading areas; and
 - Operational controls, including reduced loading rates during high wind conditions and suspension of loading activities when necessary to maintain compliance with 20.2 NMAC; prior to active mine operations that involve the placement of ore in storage piles or transfer of ore to haul trucks:
 - RHR shall install, calibrate, maintain, and operate an anemometer or equivalent technology to measure the wind speed at the facility to aid in decision making as it pertains to controlling dust from ore handling activities;
 - Truck bed management, including prompt tarping or covering of loads prior to departure to prevent off-site transport of radioactive particulates; and
 - Housekeeping and cleanup, including regular removal of spilled materials and application of dust suppressants in loadout areas.

4.1.12 **Underground Ventilation and Radon Management**

Radon generated within underground workings will be managed through engineered ventilation systems designed to:

- Maintain airflow sufficient to prevent accumulation of radon and its progeny in active work areas;
- Direct contaminated air to designated exhaust points for controlled surface release; and
- Minimize recirculation of radon-laden air within the mine.

Ventilation exhaust points will be evaluated as potential emission sources under 20.2 NMAC and 40 CFR Part 61. Where required, emissions will be quantified and controlled to comply with applicable public dose limits.

4.1.13 **Water Treatment Plant (WTP) – Radon Generation and Emissions**

Mine dewatering flows may contain dissolved radon (Rn-222), which can be released to the atmosphere during treatment processes (e.g., aeration, agitation, or pressure reduction). The following controls will be implemented:

- **Process design to manage radon stripping:** Treatment units will be designed to account for radon volatilization, including selection of process configurations that minimize uncontrolled emissions.

- **Enclosure and ventilation controls:** Aeration basins, tanks, or towers will be enclosed or partially enclosed where practicable, with ventilation directed to controlled release points.
- **Emission quantification and permitting:** Radon emissions from WTP operations will be estimated using mass balance or other accepted methodologies and evaluated for applicability under 20.2 NMAC and federal radionuclide NESHAP requirements.
- **Operational controls:** Adjustment of flow rates, retention times, and aeration intensity to balance treatment efficiency with minimization of radon release, where practicable and consistent with discharge requirements under 20.6.2 NMAC.

4.1.14 Fugitive Dust and Radiological Particulate Controls

Fugitive dust containing radioactive particulates will be minimized through implementation of best management practices, including:

- Watering of haul roads and disturbed areas;
- Application of approved chemical dust suppressants where appropriate;
- Speed limits and traffic controls to reduce dust entrainment; and
- Prompt stabilization or reclamation of disturbed surfaces.

These measures are designed to control emissions of particulate matter and associated radionuclides in compliance with 20.2 NMAC and applicable federal standards.

4.1.15 Monitoring, Recordkeeping, and Compliance

The Project will implement monitoring programs sufficient to demonstrate compliance with applicable air quality and radiological standards, including:

- Periodic measurement or estimation of radon flux from representative surfaces;
- Monitoring or modeling of radionuclide emissions from ventilation exhausts and WTP processes; and
- Recordkeeping and reporting consistent with permit conditions and regulatory requirements.

Monitoring data will be maintained as part of the Project administrative record and will support regulatory inspections, audits, and adaptive management actions.

4.1.16 Ventilation Shaft Emissions and Air Quality Management

Ventilation of underground mine workings is required to maintain safe operating conditions for personnel and to control radiological and non-radiological air contaminants. Exhaust air from the mine will be discharged to the surface through designated ventilation shafts and will ultimately enter the ambient air environment. These exhaust emissions will include, but are not limited to, radon gas and its short-lived progeny, fugitive dust (including uranium-bearing particulates), diesel particulate matter (DPM) from underground equipment, and trace combustion gases such as nitrogen oxides (NO_x), carbon monoxide (CO), and carbon dioxide (CO₂).

4.1.17 Emissions Quantification

Potential emissions from the ventilation shafts will be quantified and evaluated as part of the National Environmental Policy Act (NEPA) analysis supporting this Plan of Operations. Emission estimates will be developed using a combination of site-specific data and accepted modeling approaches, including:

- Measured or estimated radon emanation rates from underground workings and ore zones;
- Ventilation flow rates (cubic feet per minute) and shaft-specific discharge characteristics;
- Equipment fleet specifications and diesel emission factors;
- Particulate generation rates based on mining methods and control efficiencies.

Air dispersion modeling will be conducted using U.S. Environmental Protection Agency (EPA)-approved models (e.g., AERMOD or equivalent) to predict ambient concentrations of pollutants at the site boundary and at nearby sensitive receptors. The analysis will demonstrate compliance with applicable standards, including National Ambient Air Quality Standards (NAAQS) and relevant radiological dose limits (e.g., 40 CFR Part 61, Subpart B for radon emissions from underground uranium mines).

The Project will generate air emissions associated with mobile and stationary equipment, material handling, and fugitive dust sources. A preliminary, screening-level emissions inventory has been developed to support evaluation of potential impacts and to inform permitting requirements.

The inventory was prepared using standard U.S. Environmental Protection Agency (EPA) methodologies, including AP-42 emission factors and NONROAD engine emission factors, and is based on representative equipment types, horsepower ratings, load factors, and operating hours. Conservative assumptions were applied to reflect peak operational conditions and simultaneous equipment use, such that the estimates represent an upper-bound evaluation of potential emissions.

Emissions were calculated at the equipment category level using the following general equation:

$$\text{Annual Emissions (tpy)} = \frac{EF \times HP \times LF \times H \times N}{907,200}$$

Where emission factors (EF) are expressed in grams per horsepower-hour, and other variables represent equipment characteristics and operating conditions. Annual emissions were converted to daily and hourly values using standard unit conversions, with additional peak adjustment factors applied to represent maximum potential operating conditions.

Fugitive dust emissions were estimated using EPA AP-42 methodologies for unpaved roads and material handling, with control efficiencies applied to reflect implementation of dust suppression measures.

The results of the preliminary emissions inventory are presented below.

Preliminary Air Emissions Inventory

Equipment Category	Avg HP / Size	Hrs/yr	PM10 tpy	PM10 lb/day	PM10 lb/hr	NOx tpy	NOx lb/day	NOx lb/hr	CO tpy	VOC tpy
Excavators	300 HP	3,000	2.5	17	2.1	28	187	23	9	3
Wheel Loaders	350 HP	3,500	3.5	24	3.0	42	280	35	14	5
Haul Trucks	600 HP	4,000	18	123	15	120	800	100	40	12
Dozers	400 HP	3,500	4.2	29	3.6	48	320	40	16	5
Graders	250 HP	2,000	1.8	12	1.5	18	120	15	6	2
Backhoes	150 HP	2,000	0.8	5	0.7	9	60	7.5	3	1
Water Trucks*	400 HP	3,500	(-20)	(-137)	(-17)	45	300	38	15	5
Pickup Trucks	150 HP	4,000	1.2	8	1.0	15	100	12	20	6
Drill Rigs	500 HP	3,000	6	41	5.1	65	433	54	20	7
Air Compressors	~900 cfm	4,000	5	34	4.2	70	467	58	25	8
Generators	~500 kW	6,000	4	27	3.3	60	400	50	18	6
Ventilation Fans (11 shafts)	Electric w/ diesel backup	8,000	2.8	19	2.3	41	273	34	14	5

* Water trucks represent **net reduction in fugitive dust emissions**

** Ventilation fans assumed electric; emissions reflect backup diesel only

Preliminary Fugitive Dust

Source Category	PM10 (tpy)	PM10 (lb/day)	PM10 (lb/hr)
Unpaved Roads	45 – 70	300 – 470	38 – 60
Material Handling	10 – 20	70 – 135	9 – 17
Stockpiles	5 – 10	35 – 70	4 – 9
Construction Areas	5 – 10	35 – 70	4 – 9

Preliminary Total Project Emissions Summary

Pollutant	Annual (tpy)	Daily (tons/day)	Hourly (lb/hr)
PM10	95 – 150	0.5 – 0.85	55 – 85
PM2.5	32 – 52	0.16 – 0.3	16 – 32
NOx	330 – 500	2.0 – 3.0	160 – 220
CO	160 – 260	0.9 – 1.5	85 – 130
VOC	45 – 65	0.2 – 0.35	20 – 40

Daily and hourly emissions represent screening-level estimates derived from annual emissions assuming conservative operating schedules and peak activity conditions; these values will be refined during detailed design and permitting.

4.1.18 Monitoring Devices and Monitoring Plan

A comprehensive air monitoring program will be implemented to characterize and verify emissions from ventilation shafts and to protect workers and the public. Monitoring will include:

- **Continuous Radon Monitoring:** Installation of continuous radon monitors at primary ventilation exhaust points to measure radon concentrations in real time.
- **Periodic Radon Progeny Sampling:** Grab or integrated sampling to quantify working levels (WL) of radon decay products.
- **Particulate Monitoring:** Use of high-volume or continuous particulate samplers (e.g., PM₁₀/PM_{2.5}) at or near shaft outlets and site boundary locations.
- **Diesel Particulate Monitoring:** Periodic measurement of DPM concentrations in exhaust air using established occupational and ambient monitoring techniques.
- **Meteorological Monitoring:** On-site meteorological station(s) to collect wind speed, wind direction, temperature, and atmospheric stability data to support dispersion modeling and data interpretation.

Monitoring equipment will be maintained and calibrated in accordance with manufacturer specifications and applicable regulatory guidance. Data will be recorded, quality-assured, and retained for reporting and compliance purposes. See **Figure 40** – Typical Layout for Ventilation Shaft/Air Quality Monitoring Station.

4.1.19 Reporting and Compliance

Monitoring results will be compiled and reported in accordance with applicable federal and state requirements, including submission to the U.S. Forest Service and other regulatory agencies as required. Reporting includes:

- Quarterly and annual summaries of radon emissions and calculated dose estimates;
- Documentation of exceedances, if any, and associated corrective actions;
- Updates to emissions estimates and modeling, as warranted by operational changes or monitoring data.

Records will be maintained on-site and made available for agency review upon request.

4.1.20 Mitigation Measures

To minimize emissions from ventilation shafts and associated impacts to ambient air quality, the following mitigation measures will be implemented:

- **Ventilation Controls:** Optimization of ventilation flow to balance worker safety with minimization of unnecessary exhaust volumes;
- **Water Suppression:** Application of water sprays or mists underground to reduce particulate entrainment;

- **Equipment Emissions Controls:** Use of low-emission diesel engines meeting current EPA Tier standards and implementation of idling restrictions;
- **Radiological Controls:** Operational practices to limit exposure of high-grade ore surfaces and prompt backfilling or sealing of inactive areas to reduce radon release;
- **Exhaust Management:** Where feasible, routing of exhaust through engineered discharge configurations to enhance atmospheric dispersion.

4.1.21 Adaptive Management

An adaptive management approach will be applied to ventilation emissions. Monitoring data will be routinely evaluated to assess the effectiveness of controls and to identify trends. If monitoring indicates that emissions are higher than predicted or approaching regulatory thresholds, additional mitigation measures—such as increased dust suppression, ventilation adjustments, or localized filtration technologies—will be implemented as necessary.

This approach verifies that emissions from underground ventilation shafts are proactively managed, transparently reported, and maintained within applicable regulatory limits while supporting safe and efficient mining operations.

4.1.22 Vehicle and Equipment Maintenance Procedures

On-road and off-road vehicles, as well as stationary combustion equipment (e.g., generators, compressors, and support equipment), will be maintained in accordance with manufacturer specifications and applicable regulatory standards to verify efficient operation and reduced emissions. Maintenance practices will include:

- Routine preventative maintenance (e.g., oil changes, filter replacement, fuel system maintenance, and engine tuning);
- Inspection and maintenance of exhaust and emission control systems (e.g., diesel particulate filters, catalytic converters);
- Prompt repair of malfunctioning equipment that exhibits excessive exhaust opacity, visible emissions, or abnormal performance;
- Use of ultra-low sulfur diesel fuel and other compliant fuels as required by federal and state regulations; and
- Minimization of unnecessary idling through operator training and administrative controls.

Where practicable, newer, lower-emission equipment meeting current federal emission standards will be prioritized for use on-site.

4.1.23 Monitoring and Inspection

The Project will implement routine inspection and monitoring procedures to verify that maintenance practices are effective in minimizing emissions:

- **Visual Inspections:** Operators and maintenance personnel will conduct regular visual inspections of vehicles and equipment for signs of excessive exhaust, smoke, or leaks.
- **Opacity/Emission Observations:** Equipment exhibiting visible emissions beyond normal operating conditions will be removed from service until repaired.

- Scheduled Inspections: Preventative maintenance inspections will be conducted at manufacturer-recommended intervals or more frequently based on operating conditions.
- Spot Checks: Supervisory personnel will conduct periodic spot checks of equipment operating on access roads, haul roads, and at surface facilities to verify compliance.

4.1.24 Responsible Personnel

Responsibility for implementation of the vehicle and equipment maintenance and monitoring program will be clearly defined:

- A designated Environmental Manager (or equivalent qualified individual) will have overall responsibility for ensuring compliance with air quality requirements and integration of maintenance practices into the Project's air quality program.
- A Maintenance Supervisor will be responsible for scheduling, performing, and documenting routine and corrective maintenance activities.
- Equipment Operators will be responsible for conducting daily pre-operation inspections and reporting any equipment issues that could affect emissions.
- Environmental and Safety Staff will conduct periodic audits and inspections to verify compliance with maintenance and emission control requirements.

Personnel will receive appropriate training regarding their roles and responsibilities in minimizing air emissions.

4.1.25 Documentation and Recordkeeping

The Project will maintain records sufficient to demonstrate compliance with applicable air quality requirements and implementation of maintenance procedures. Documentation will include:

- Maintenance logs for vehicles and equipment, including dates, services performed, and corrective actions;
- Inspection records, including daily operator checklists and supervisory inspection reports;
- Records of equipment removed from service due to emission concerns and documentation of repairs; and
- Training records for personnel involved in maintenance and inspection activities.

Records will be retained on-site or at a designated administrative location and will be made available to regulatory agencies upon request, consistent with applicable requirements of the New Mexico Environment Department and the U.S. Environmental Protection Agency.

4.1.26 Integration with Air Quality Management

These maintenance, monitoring, and documentation procedures will be incorporated into the Project's overall air quality and fugitive dust control programs to verify a coordinated approach to minimizing emissions from both mobile and stationary sources throughout the life of the Project.

4.2 Water Quality

The Project has been developed with consideration of the hydrologic setting of the San Mateo Creek watershed and the broader Rio San Jose basin, where surface water and groundwater systems are interconnected but highly variable in occurrence, flow regime, and water quality. Baseline investigations documented in the Surface Water and Groundwater BDRs provide the basis for understanding existing conditions, evaluating hydrologic connectivity, and designing water management measures protective of downstream resources and designated uses.

Baseline data were collected to characterize surface water flow regimes, sediment and water chemistry, spring occurrence, groundwater occurrence within multiple aquifer systems, and hydraulic relationships between geologic units. These investigations incorporate historical datasets (including USGS gaging records and prior mining studies), as well as site-specific monitoring, sampling, and hydrologic assessments conducted since 2008.

Water quality monitoring for the Project will be dictated by National Pollutant Discharge Elimination System (NPDES) Discharge Permit conditions and will generally include baseline (pre-operational), operational, and post-closure components addressing both non-point source and point source conditions. Non-point source monitoring will focus on stormwater runoff from disturbed areas (e.g., well pads, access roads, and shaft pads) and will include event-based sampling (e.g., retention basin outlets following storm events, when practical) to evaluate sediment and water quality. Point source monitoring will be conducted for permitted discharges in accordance with applicable permit requirements (e.g., NPDES and/or NMED discharge permits), including monitoring of flow, water quality parameters, and constituents of concern. Groundwater monitoring will be conducted throughout operations and post-closure to evaluate drawdown, water quality trends, and aquifer recovery. Monitoring results will be compared to applicable regulatory standards and baseline conditions, and adaptive management measures will be implemented as necessary to address exceedances or unanticipated conditions.

Water quality protection for the Project is addressed through an integrated set of design features, operational controls, monitoring programs, and reclamation measures described throughout this POO-MORP. In addition to the specific measures outlined in this section, relevant water quality components are described in Section 3.1.3 (Mine Dewatering), Section 3.2.3 through 3.2.6 (Stormwater Management, Water Treatment, Discharge Pipeline, and Surface Water Management Infrastructure), Section 3.4 (Sediment Control); Section 6.4 (Toxic Drainage After Reclamation), and Section 7.1 through 7.3 (Stormwater Quality, Best Management Practices, and Hydrologic Balance Protection). These sections collectively describe source control measures, engineered systems (e.g., lined ponds and water treatment), monitoring and adaptive management approaches, and long-term reclamation strategies to protect both surface water and groundwater resources throughout the life of the Project.

Additional design details for surface water controls are provided in **Appendix B** (Surface Water Management Plan), and construction-phase water quality protection measures will be described in a SWPPP developed and maintained in accordance with applicable regulatory requirements.

4.2.1 Surface Water

The Project area is located within the San Mateo Creek watershed, a tributary to the Rio San Jose, which ultimately contributes to the Rio Puerco and the Rio Grande. Surface water resources in the Project vicinity are characterized by predominantly ephemeral and intermittent flow regimes,

with perennial flow limited to localized headwater reaches sustained by spring discharge and impoundments for irrigation use.

San Mateo Creek exhibits strong seasonal variability, with flows driven by snowmelt and episodic precipitation events. Historical and baseline data indicate that sustained flow is limited, and downstream reaches are largely ephemeral, with channel losses to alluvium and infiltration preventing consistent hydrologic connection to the Rio San Jose except during high runoff events.

Other drainage features in the Project area, including Arroyo del Puerto and San Lucas Arroyo, function as ephemeral conveyances with short-duration flow events, rapid infiltration, and limited downstream continuity. Springs within the watershed are sparse, generally low-volume, and associated with geologic contacts or structural features. These conditions establish a hydrologic system where surface flow is intermittent, spatially discontinuous, and strongly influenced by precipitation and subsurface interactions.

Surface water quality reflects both natural geochemical conditions and legacy mining influences, with constituent variability observed in both water and sediment depending on watershed geology, historical disturbance, and flow conditions. These baseline conditions provide the reference framework for evaluating Project-related discharges and establishing permit limits.

4.2.1.1 Rio San Jose Discharge

RHR's proposed mine plan includes building a water treatment plant at the mine site in Section 17 and piping treated mine water ~20 miles from the mine site to the proposed RSJ discharge point upstream of the Stanley Street Bridge, near Skytop Park in the Village of Milan. The discharge plan is detailed in Addendum 1 to the Roca Honda Mine BDR (July 2018). A National Pollutant Discharge Elimination System (NPDES) permit will be obtained in accordance with the Clean Water Act and 40 CFR Part 122 prior to any discharge to waters of the United States.

The NPDES and stormwater permitting strategy is informed by baseline hydrologic and water quality conditions documented for San Mateo Creek, San Lucas Arroyo, and the Rio San Jose system. As demonstrated by baseline data, flows in upstream tributaries are predominantly ephemeral, and the Rio San Jose itself exhibits intermittent to ephemeral conditions in downstream reaches, with flow presence influenced by storm events, upstream contributions, and localized groundwater inputs.

4.2.1.1.1 Discharge Characterization and Receiving Water Evaluation

The proposed discharge was evaluated relative to existing hydrologic and water quality conditions in the Rio San Jose, including:

- Existing flow regime (ephemeral/intermittent conditions and stormwater dominance);
- Baseline water quality and sediment chemistry;
- Existing upstream influences, including historic mining and municipal discharges; and
- Downstream designated uses and applicable water quality standards under NMAC 20.6.4.

Hydrologic assessments will confirm the extent to which discharge will augment flow in normally dry or low-flow channels and evaluate potential changes to flow permanence, channel hydraulics, and infiltration behavior.

This evaluation is detailed in the Report for Rio San Jose Characterization – 2019 Field Work (Feb 2020).

4.2.1.1.2 Effluent Characterization and Treatment

Discharges will be treated, as necessary, to meet technology-based effluent limitations and water quality-based effluent limits (WQBELs) derived from applicable standards. Effluent characterization will include:

- Major ions and total dissolved solids;
- Metals and trace constituents associated with site geology and historic mining; and
- pH, total suspended solids, and other conventional parameters.

Effluent limits will be established to protect downstream uses, taking into account the assimilative capacity of the receiving water under low-flow and no-flow conditions.

4.2.1.1.3 Antidegradation and Water Quality Protection

The discharge will be evaluated under New Mexico's antidegradation policy to verify that:

- Existing uses are fully protected;
- Water quality necessary to support designated uses is maintained; and
- Any lowering, if determined, of water quality is justified and minimized.

This evaluation will incorporate baseline data demonstrating existing conditions, including legacy impacts and natural background concentrations.

4.2.1.1.4 Construction and Operational Water Use

Water sources will be implemented in a manner consistent with Project sequencing and regulatory approvals, including the New Mexico Mine Dewatering Act.

During early-phase activities, including developmental drilling that may occur prior to establishment of dewatering and treatment systems, water will be supplied by:

- Existing shallow wells completed within the Gallup Formation, where available and subject to agency approval; or
- Hauled water from off-site commercial sources delivered via water trucks.

As the Project advances and dewatering and treatment systems become operational, treated mine water may be reused, where appropriate and subject to applicable regulatory approvals, to support operational water demands including dust abatement (e.g., road and pad dust suppression), developmental drilling, equipment washing, and other construction and operational activities that do not require potable water. Accordingly, water sourcing will transition over time:

- **Initial phase:** Approved shallow wells and/or hauled water supply; and
- **Operational phase:** Incorporation of treated mine water for operational uses where appropriate.

Water use will be managed to minimize unnecessary consumption while protecting water quality and supporting compliance with applicable state and federal requirements.

Water used for dust abatement and developmental drilling will be applied only as necessary to support safe construction and operational activities. Water demand will vary throughout the life of the Project based on the extent of active disturbance, traffic volumes, weather conditions, seasonal variability, and the frequency of drilling activities. Dust suppression will be concentrated on active haul roads, access roads, drill pads, laydown areas, and other disturbed surfaces where fugitive dust generation has the potential to occur. Water application rates will be adjusted to site conditions to provide effective dust control while minimizing overall water consumption.

In addition to water application, the Project will implement Best Management Practices (BMPs) to reduce water demand and minimize potential effects on water resources. These measures may include minimizing the extent of disturbed areas, phased construction, progressive reclamation of completed work areas, traffic management, speed controls, stabilization of disturbed surfaces where appropriate, and implementation of erosion and sediment control measures. Collectively, these practices are intended to reduce both the volume of water required for dust suppression and the potential for sediment transport or degradation of water quality on National Forest System lands.

Because construction and operational water demands represent a small fraction of the overall mine water management system and will increasingly be met using treated mine water following commencement of dewatering operations, long-term reliance on external water sources is expected to decrease substantially over the life of the Project.

Mine water temporarily used for operational purposes remains within the Project water management system and does not change the proposed long-term disposition of treated mine water through discharge to the Rio San Jose.

Mine dewatering volumes, pumping locations, and operational sequencing are addressed separately in Section 4.2.1.1. The existing Mine Dewatering Permit was developed for the original mine plan and will be amended through the New Mexico Office of the State Engineer to reflect the revised mine plan, including revised points of diversion (dewatering wells), updated groundwater modeling, revised pumping schedules, and other modifications necessary to support the current mine design. Accordingly, the final quantities of groundwater withdrawn from individual dewatering wells and the timing of those withdrawals will be established through the NMOSE permit amendment process.

4.2.1.1.5 *Monitoring and Compliance*

Once issued, a comprehensive monitoring program will be implemented as part of the NPDES permit and will include:

- Effluent monitoring at the point of discharge;
- Receiving water monitoring upstream and downstream of the discharge location;
- Flow monitoring to characterize discharge contributions relative to natural conditions; and
- Sediment monitoring, where applicable, to evaluate potential deposition of constituents.

Monitoring results will be used to verify compliance with permit limits, evaluate potential impacts to receiving waters, and support adaptive management.

4.2.1.1.6 *Adaptive Management and Contingency Measures*

As necessary, the Project will implement adaptive management measures to respond to monitoring results and changing site conditions, including:

- Adjustment of treatment processes to maintain compliance;
- Operational controls to limit discharge during sensitive hydrologic conditions; and
- Contingency measures for upset conditions or exceedances.

These measures are designed to support continued protection of the Rio San Jose system under variable hydrologic conditions, including:

- Existing flow regime (ephemeral/intermittent conditions and stormwater dominance);
- Baseline water quality and sediment chemistry;
- Existing upstream influences, including historic mining and municipal discharges; and
- Downstream designated uses and applicable water quality standards under NMAC 20.6.4.

Hydrologic assessments will confirm the extent to which discharge will augment flow in normally dry or low-flow channels and evaluate potential changes to flow permanence, channel hydraulics, and infiltration behavior.

4.2.1.2 *Stormwater Management and Protection*

A SWPPP, in compliance with applicable U.S. Environmental Protection Agency (EPA), State of New Mexico, and U.S. Forest Service requirements, will be developed and implemented for the Project. The SWPPP will be finalized and in place prior to the commencement of any ground-disturbing activities and will be maintained throughout construction and operations in accordance with applicable regulatory requirements.

Stormwater Hydrologic Considerations:

Stormwater runoff within the Project area is characterized by:

- Rapid runoff response during precipitation events;
- Short-duration, high-intensity flow within ephemeral channels;

- High sediment transport potential during storm events; and
- Significant infiltration losses in downstream channel segments.

Stormwater controls will be designed to manage both peak flow and pollutant loading under event-driven conditions.

Best Management Practices (BMPs):

The SWPPP will incorporate structural and non-structural BMPs to minimize erosion, sediment transport, and contaminant mobilization, including:

- Diversion channels and berms to direct clean stormwater away from disturbed areas;
- Sediment control structures (e.g., sediment basins, wattles, silt fences);
- Stabilized construction entrances and access roads to reduce tracking;
- Progressive reclamation and revegetation to reduce exposed soils; and
- Surface stabilization (mulch, erosion control blankets, or rock armoring) in high-risk areas.

BMP selection and placement will be tailored to site-specific conditions, including slope, soil type, and drainage characteristics.

4.2.1.2.1 Industrial Stormwater Controls

Operational areas with potential pollutant sources (e.g., material handling, equipment maintenance, treatment facilities) will implement additional controls, including:

- Secondary containment for chemicals and fuels;
- Covered storage or bermed areas for materials exposed to precipitation;
- Run-on and run-off controls to isolate industrial areas from stormwater flow; and
- Good housekeeping practices and routine inspection protocols.

Stormwater from industrial areas will be managed to prevent commingling with process water unless specifically designed and permitted.

4.2.1.2.2 Discharge Pipeline Corridor Stormwater Controls (Highway 605 Right-of-Way)

Stormwater management measures will be specifically implemented along the Highway 605 pipeline Right-of-Way corridor to address linear disturbance and drainage crossings. These measures will include:

- Installation of water bars, slope breakers, and trench breakers to prevent concentrated flow along the pipeline alignment;
- Stabilization of disturbed soils immediately following construction activities;
- Erosion protection at drainage crossings, including armoring and revegetation; and
- Inspection and maintenance of crossings following storm events to identify and repair erosion or sedimentation.

Construction within drainage crossings will be minimized and conducted under dry conditions where practicable.

4.2.1.2.3 *Monitoring, Inspection, and Maintenance*

The SWPPP will include a comprehensive inspection and monitoring program consisting of:

- Routine inspections of BMPs during active construction and operation;
- Post-storm inspections following qualifying precipitation events;
- Documentation of BMP performance and maintenance actions; and
- Corrective actions for identified deficiencies.

Stormwater discharge points will be monitored, as required, to verify compliance with permit conditions and confirm that pollutant discharges are minimized.

4.2.1.2.4 *Adaptive Management and Compliance*

Stormwater controls will be adaptively managed based on monitoring results, inspection findings, and observed site conditions. This includes:

- Modification or replacement of BMPs where performance is inadequate;
- Implementation of additional controls in response to observed erosion or sediment transport; and
- Integration with NPDES discharge requirements and operational controls.

Stormwater management activities will be conducted in coordination with the overall water management system to verify protection of surface water resources and compliance with applicable regulatory requirements.

Methods to control erosion and surface water runoff from disturbed areas, including stockpiles and other operational features, are described in Section 3.4 and **Appendix B**. These measures include diversion structures, stormwater controls, and erosion control best management practices (BMPs) designed to minimize sediment transport and maintain separation of contact and non-contact water.

4.2.1.3 *Section 404 Compliance and Jurisdictional Determination*

Surface-disturbing activities associated with the proposed operation, including construction of surface facilities and installation of the discharge pipeline, have the potential to intersect ephemeral drainage features (arroyos) characteristic of the semi-arid environment in McKinley County, New Mexico. These features may convey stormwater during precipitation events and, depending on site-specific conditions, may be considered Waters of the United States (WOTUS) subject to regulation under Section 404 of the Clean Water Act (CWA).

The proposed discharge pipeline will be installed within an existing New Mexico Department of Transportation (NMDOT) right-of-way along Highway 605. Use of this previously disturbed corridor is intended to minimize new surface disturbance and reduce impacts to undisturbed lands; however, the alignment may still cross ephemeral arroyos that intersect the highway corridor.

Prior to the initiation of ground-disturbing activities, RHR will request an Approved Jurisdictional Determination (AJD) from the U.S. Army Corps of Engineers (USACE) to identify the presence, extent, and classification of any jurisdictional waters or features within the Project area, including ephemeral arroyos crossed by the proposed discharge pipeline alignment within the NMDOT

right-of-way, as well as the Rio San Jose at the proposed discharge location. The AJD will be used to determine whether authorization under Section 404 of the CWA is required.

If jurisdictional waters are identified and Project activities would result in the placement of dredged or fill material within those features, the operator will obtain the appropriate Section 404 authorization from USACE prior to construction. Authorization may be sought under an applicable Nationwide Permit (NWP), if impact thresholds and conditions are met, or through an Individual Permit if required. Permit conditions and stipulations will be incorporated into Project design and construction practices.

To minimize impacts to jurisdictional features (if existing), the following design and operational measures will be implemented:

- The discharge pipeline will be installed within the existing NMDOT Highway 605 right-of-way to minimize new disturbance;
- Pipeline alignment will, to the extent practicable, avoid and minimize crossings of ephemeral arroyos within the corridor;
- Where crossings are unavoidable, the pipeline will be installed using methods that minimize disturbance to the channel bed and banks (e.g., trenchless installation where feasible or narrow trench construction during dry conditions);
- Disturbed areas within and adjacent to arroyo crossings will be stabilized following construction using appropriate erosion and sediment control measures consistent with site conditions;
- No permanent fill will be placed within jurisdictional features unless authorized under a valid Section 404 permit; and
- The engineered discharge structure within the Rio San Jose will be designed to minimize disturbance to the channel and maintain hydraulic function and channel stability.

In the event that no jurisdictional waters are identified through the AJD, documentation of the USACE determination will be maintained in the Project file, and no Section 404 permit will be required.

Activities will be conducted in compliance with applicable federal regulations, and in coordination with the U.S. Forest Service to confirm protection of aquatic resources and ephemeral drainage systems within the Project area.

4.2.2 Groundwater

The conceptual mine dewatering system is described in Section 3.1.3 and illustrated on Figure 18. These conceptual layouts identify the anticipated locations and general configuration of dewatering wells for planning and environmental review purposes. Final dewatering well locations, pumping rates, pumping schedules, and other operating parameters will be established through the New Mexico Office of the State Engineer (NMOSE) Mine Dewatering Permit amendment process based on the final mine design, updated groundwater modeling, and supporting engineering analyses.

Groundwater monitoring during mining operations will be conducted in accordance with applicable New Mexico Environment Department (NMED) Water Quality Bureau (WQB) requirements and consistent with the approved Discharge Plan (DP) and associated monitoring plans developed under NMAC 20.6.2 (Ground and Surface Water Protection).

Building upon the baseline data collection and aquifer testing described in the BDRs, the Project will implement an operational groundwater monitoring program designed to evaluate potential impacts to groundwater quality, groundwater levels, and aquifer performance during active mining and dewatering.

Groundwater monitoring for the Project will address aquifers authorized under the New Mexico Office of the NMOSE dewatering permit, including the Westwater Canyon Member of the Morrison Formation and the overlying Dakota Sandstone and Gallup Sandstone. The monitoring network will consist of existing and Project-installed wells distributed upgradient, within, and downgradient of key Project features, including mine shafts, dewatering wells, and areas of active development. Monitoring will include measurement of groundwater levels and water quality to evaluate drawdown, aquifer response, and potential impacts over time. Monitoring data will also be used to evaluate potential hydraulic connectivity between formations, including fracture flow and inter-aquifer interactions, as informed by ongoing data collection and groundwater modeling.

4.2.2.1 Monitoring Network and Well Construction

The operational monitoring network will consist of a combination of:

- Existing baseline monitoring wells installed in key hydrostratigraphic units (e.g., alluvium, Menefee Formation, and deeper bedrock aquifers such as the Westwater Canyon Member, where applicable);
- Dedicated compliance wells installed, as required, to meet Discharge Plan monitoring requirements; and
- Production and observation wells associated with mine dewatering activities.

Monitoring well locations, screened intervals, and construction specifications will be designed to:

- Provide representative coverage of upgradient and downgradient conditions;
- Monitor hydraulically connected aquifers and any units of regulatory concern; and
- Detect potential vertical or lateral migration of constituents.

Monitoring wells will be installed and maintained in accordance with NMED WQB guidance and applicable industry standards.

4.2.2.2 Monitoring Parameters and Frequency

Groundwater monitoring will include both water level measurements and water quality sampling. Parameters will be established in accordance with the approved Discharge Plan and are expected to include:

- Field parameters (e.g., pH, specific conductance, temperature);
- Major ions and total dissolved solids;
- Metals and trace constituents associated with site geology and historical mining; and
- Any additional parameters required by NMED WQB based on site-specific conditions.

Sampling frequency will be defined in the Discharge Plan and may include:

- Quarterly monitoring during initial operations;
- Adjusted frequency based on demonstrated stability and regulatory approval; and

- Additional sampling as needed during key operational phases (e.g., initiation of dewatering).

Water level monitoring will be conducted at a frequency sufficient to characterize:

- Changes in potentiometric surfaces associated with mine dewatering;
- Hydraulic gradients and flow directions; and
- Recovery trends during periods of reduced pumping or post-mining.

4.2.2.3 Dewatering Monitoring and Aquifer Response

Groundwater monitoring during dewatering will focus on evaluating aquifer response, including:

- Drawdown extent and magnitude in the targeted production zone;
- Potential propagation of drawdown into adjacent aquifers; and
- Verification of model predictions developed during baseline hydrogeologic analysis.

Where applicable, monitoring data will be compared to baseline conditions and predictive modeling results to confirm that dewatering effects remain within expected and permitted limits.

4.2.2.4 Compliance and Reporting

Groundwater monitoring data will be collected, managed, and reported in accordance with NMED WQB requirements, including:

- Submittal of periodic monitoring reports to NMED WQB as specified in the Discharge Plan;
- Documentation of sampling methods, analytical results, and quality assurance/quality control procedures; and
- Identification and evaluation of any exceedances of applicable standards or permit conditions.

In the event that monitoring results indicate a potential exceedance or unanticipated impact, the Project will implement notification, investigation, and corrective action procedures consistent with NMAC 20.6.2 requirements and Discharge Plan conditions.

4.2.2.5 Adaptive Management and Plan Refinement

The groundwater monitoring program will be subject to adaptive management and may be refined over time in coordination with NMED WQB based on:

- Monitoring results and observed trends;
- Operational changes or modifications to mine design; and
- Updated hydrogeologic understanding.

Any modifications to the monitoring program will be submitted to and approved by NMED WQB, as required.

4.3 Temporary Cessation – Site-Wide Procedures

In the event of a temporary cessation of operations, RHR would implement the following site-wide procedures to support continued protection of public safety, environmental resources, and compliance with applicable federal and state regulatory requirements, including those administered by the U.S. Forest Service, Mine Safety and Health Administration, and the State of New Mexico.

4.3.1 Maintaining the Project in Safe Condition

A trained workforce would remain on-site to conduct inspection, maintenance, and security functions during the cessation period. Activities would continue to comply with MSHA requirements (30 CFR) and applicable New Mexico safety regulations. Routine inspections of underground workings, surface facilities, and infrastructure would be maintained.

Site security measures, including controlled access points, fencing, and surveillance, would remain in effect across both private and National Forest System lands. Hazard warning signage would be maintained or enhanced to clearly identify risks associated with underground mine openings, shafts, declines, process facilities, and areas containing fuels, reagents, or hazardous materials.

Access to underground workings would be restricted to authorized personnel for inspection, maintenance, and safety monitoring purposes only.

4.3.2 Stabilizing Excavations and Underground Workings

Surface and subsurface excavations within the Project area, including those located on NFS lands, would be maintained in a stable condition. This includes:

- Routine inspection and maintenance of pit walls, slopes, declines, shafts, and underground openings.
- Implementation of erosion control measures to prevent stormwater infiltration, sediment transport, or slope degradation.
- Restriction of unauthorized access to excavations and underground openings.
- Temporary underground openings (e.g., stopes) developed prior to cessation would be stabilized, as necessary, using engineered controls such as cemented paste backfill, rock bolting, and/or shotcrete.

- Permanent mine infrastructure (e.g., shafts, declines, haulage ways, and underground facilities) would remain open but secured, monitored, and maintained in accordance with MSHA standards and accepted engineering practices.

4.3.3 Management of Regulated Materials

Regulated materials, including hazardous substances, fuels, and process reagents, would be managed in accordance with applicable federal and New Mexico regulations (e.g., RCRA, NMAC), as well as Project-specific plans such as the Spill Prevention, Control, and Countermeasure (SPCC) Plan.

During temporary cessation:

- Materials required for ongoing inspection, maintenance, and water management activities would be stored, handled, and monitored consistently with operational protocols;
- Excess or unused materials would be removed from the site and returned to vendors or disposed of at authorized facilities; and
- Storage systems, including aboveground storage tanks and containment structures, would be inspected, maintained, and, where appropriate, emptied and secured.

Material storage and handling practices would continue to prioritize prevention of releases to soil, surface water, and groundwater.

4.3.4 Maintaining Access and Utilities

Project access roads, including those on NFS lands and authorized rights-of-way, would be maintained to support safe and reliable access for inspection, maintenance, and emergency response. Road maintenance would include grading, drainage control, and erosion prevention as necessary.

Critical utilities—including electrical systems, water supply infrastructure, ventilation systems (as applicable), and fuel supply—would remain operational to support ongoing site management activities.

4.3.5 Managing Water Systems

During a temporary cessation of mining, RHR will maintain mine-water management systems necessary to protect human health, safety, and the environment and to comply with applicable permits.

If mine workings partially reflood during a temporary cessation, RHR will evaluate the pumping and treatment volumes anticipated to reestablish the approved operating condition before restarting mining.

The evaluation will identify anticipated pumping duration, pumping rates, treatment requirements, and water volumes and will reconcile those volumes with the applicable mine dewatering authorization.

Where material changes to the approved mine plan or dewatering configuration occur, RHR will obtain any required regulatory approvals before implementing those changes.

4.3.5.1 Solid waste Disposal at Permitted Facilities

Non-hazardous solid waste will be transported to a solid waste facility permitted under 20.4.1 NMAC. No on-site disposal will occur unless specifically authorized under applicable state permits. Waste handling practices will be implemented to prevent infiltration, leachate generation, or other pathways that could result in groundwater contamination in violation of 20.6.2 NMAC.

4.3.5.2 Management of Putrescible Waste

Garbage and food waste will be containerized in closed, wildlife-resistant containers and transported to a permitted municipal or regional landfill. Open burning of refuse is prohibited in accordance with 20.2 NMAC.

Inert and Construction Debris Management: Inert materials (e.g., concrete, wood) will be transported to a permitted disposal or recycling facility unless managed at an on-site facility specifically permitted under New Mexico regulations. Materials will be managed to prevent contact with stormwater or infiltration that could mobilize contaminants to groundwater.

4.3.5.3 Hazardous Waste Management

Wastes generated on-site will be evaluated at the point of generation using process knowledge and, where necessary, analytical testing to determine whether the waste meets the definition of hazardous waste under the Resource Conservation and Recovery Act (RCRA) and applicable New Mexico regulations.

Waste characterization will include, as appropriate, evaluation of ignitability, corrosivity, reactivity, and toxicity characteristics, as well as consideration of listed hazardous wastes. Based on this determination, wastes will be properly classified, containerized, labeled, stored, and disposed of in accordance with applicable regulatory requirements. Hazardous wastes will be managed in approved containers, stored in designated accumulation areas with appropriate secondary containment, and transported off-site by licensed contractors to permitted treatment, storage, and disposal facilities.

4.4 Scenic Values

Visual Resource Management is a tool used to assess aesthetic value as a resource. The scenic value component of the RHR mining proposal merits evaluation among the various environmental impacts that may occur as a result of constructing and operating the Roca Honda mine. As a general matter, the location of the Project within sight of Mt. Taylor requires that scenic values be considered. The area has been designated as a Traditional Cultural Property (TCP) and significant interest exists in projecting resources, such as scenic values. As such, the protection of scenic values at the permit area will be addressed to protect these values to the extent possible.

Scenic values in and around the permit area will be protected by minimizing visual exposure by the general public to the various surface facilities of the mine complex. The natural topographic locations in the permit area for Sections 16 and 17 are at higher elevations and therefore screened from the general public's viewshed from State Hwy 605. RHR has taken advantage of these topographic features to protect scenic values. Some structures such as the top of the head frame and the top of some buildings may be visible. Additional protection will be utilized such as screening and berming soil with vegetation as a visual barrier and painting structures to blend

with surrounding landscape colors. Exterior surface colors on buildings and other infrastructure will be selected from a list of colors approved by BLM or USFS.

At Sections 9 and 10, scenic values will be protected by utilizing the existing vegetation as a visual break between the well/ventilation shaft pads and the public road. The Section 9 and 10 pad locations will be situated in a relatively low-lying areas protected by pinón-juniper tree stands and desert scrub vegetation. While the surface facilities in Section 17 will be more visible than those on Section 16, RHR has endeavored to develop Section 17 as the main facility, placing most of the facilities where they would be the most protective of scenic values and minimization of new land disturbance. The combination of use of existing vegetation, berming of soil wherever possible, vegetation of exposed stockpiles and selection of appropriate use of color schemes for the facilities will aid in mitigating impact to scenic values.

In addition, slash and/or cleared vegetation that may have to be stripped during the site grading process will be mulched and added to topsoil stockpiles to increase the organic matter content. Timely reclamation in the permit area will include contemporaneous reclamation techniques to establish revegetation as soon as possible. Avoiding site disturbance where possible and minimizing the area when it must be disturbed, using existing roads and old drill pads where possible, removing, segregating, and stockpiling topsoil and subsoil, and returning non-ore stockpiles below ground will also be used as mitigation techniques for scenic value protection. Early reclamation reduces erosion, isolates and protects material for later use, provides mitigation of potential impacts, and reduces the final reclamation work and costs.

Exterior lighting will be designed in accordance with U.S. Forest Service scenery management objectives to minimize visual contrast and protect nighttime scenic values. Lighting will utilize fully shielded, downward-directed fixtures and will be configured to reduce skyglow and off-site visibility while maintaining required safety and operational standards. Lighting installations will be periodically reviewed during operations, and adjustments will be made as needed to confirm consistency with scenic resource protection objectives.

4.5 Fish and Wildlife

Measures to maintain and protect wildlife and their habitat are discussed in Section 7.3.2 and Appendix C.

4.6 Cultural Resources

Measures for protecting known cultural resources are described in Section 7.3.3 and Section 11.0 of the BDR. Surface-disturbing activities have been designed to avoid eligible archaeological sites to the extent practicable and provide protective buffers where feasible. Where avoidance is not possible, mitigation measures will be developed through the Section 106 consultation process.

4.7 Hazardous Substances and Storage

Hazardous materials and toxic substances may be present onsite during site preparation and mining operations in the form of bulk vehicle/equipment fluids, cleaning solvents and water treatment system process chemicals. The estimated volumes are based on short-term usage and storage and the materials will be replaced as the usage demands. The substances expected to be used onsite during site construction and operations are included in **Table 18**.

Table 19. Hazardous and Toxic Substances Used Onsite

Substance	Quantity	Description
Antifreeze	>500 gallons	A colorless, oily liquid also known as ethylene glycol equipment. Used as antifreeze coolant for equipment.
Cleaning solvents	>50 gallons	Generally colorless, blue, or yellow-green liquids. Constituents include perchloroethylene, methylene, chloride, trichloroethylene, and petroleum distillate. Used for cleaning equipment.
Diesel fuel (surface)	>30,000 gallons	A clear, blue-green, or yellow liquid. Constituents include petroleum distillates, oil and grease, naphthalene, and xylene. Used as a fuel for generators, trucks, and heavy equipment.
Red-dye diesel	>20,000 gallons	A red-dyed petroleum distillate fuel used exclusively for off-road and underground equipment. Constituents include petroleum distillates, oil and grease, naphthalene, and xylene. Stored and used underground to fuel mining equipment.
DEF (Diesel Exhaust Fluid)	1-2 totes (275 gal each)	Used in diesel engine exhaust systems to reduce nitrogen oxide (NOx) emissions by converting them into nitrogen and water vapor.
Gasoline	>6,000 gallons	A colorless, pale brown or pink liquid used as fuel for cars and trucks. Constituents include petroleum hydrocarbon, benzene, ethyl benzene, toluene, xylene, and methyl tertiary-butyl ether.
Petroleum based grease	>75 gallons	A reddish colored, semi-solid gel used as a lubricant.
Hydraulic fluid	>1,000 gallons	A brown, oily petroleum hydrocarbon used in hydraulic devices. Constituents include mineral oil.
Oil	>1,000 gallons	A brown or dark brown oily liquid used as a lubricant. Constituents include petroleum hydrocarbon.
Sulfuric or Hydrochloric acid	5–10 totes (275 gal each)	Reagent used in the water treatment process to adjust pH.
Ferric Sulfate	5–10 totes (275 gal each)	Coagulant used in the water treatment process to precipitate dissolved metals.
Sodium hydroxide	5–10 totes (275 gal each)	Reagent used in the water treatment process to adjust pH.

Substance	Quantity	Description
Calcium chloride	15–20 totes (275 gal each)	Additive used in the water treatment process to promote hardness, which can support precipitation reactions.
Descalant (antiscalant)	1-2 totes(275 gal each)	Chemical added to control mineral scaling and prevent precipitation on equipment surfaces and downstream treatment components. Typically applied upstream of filtration or membrane systems or to protect piping following lime softening.
Lime softener (hydrated lime)	Bulk storage equivalent to ~30,000–35,000 gallons (silo system; tote equivalent ~120 totes)	Reagent used to increase pH and facilitate precipitation of hardness and dissolved metals during treatment.
Magnesium sulfate	5–10 totes (275 gal each)	Reagent used in the water treatment process to adjust pH.
Flocculant (polymer)	1-2 totes(275 gal each)	Reagent used in the water treatment process to remove solid particles and colloids from water, improving filtration efficiency and reducing sludge volume.

4.7.1 Hazardous Materials and Explosives Storage

Hazardous materials and explosives will not be permanently stored or disposed of on National Forest System (NFS) lands unless specifically authorized by applicable federal approvals administered by the U.S. Forest Service. Temporary storage necessary to support authorized exploration, construction, or mining activities will occur in designated, secured areas designed to prevent unauthorized access and environmental release.

Explosive materials will be stored, handled, transported, and used in accordance with federal requirements administered by the Bureau of Alcohol, Tobacco, Firearms and Explosives under 27 CFR Part 555 (Commerce in Explosives) and operational safety standards enforced by the Mine Safety and Health Administration under 30 CFR (including Parts 56/57 for metal and nonmetal mining, as applicable).

4.7.1.1 ATF Compliance (27 CFR Part 555)

- **Approved storage magazines:** Explosives will be stored in ATF-compliant magazines (Type 1, 2, or 3, as applicable) meeting construction, fire resistance, theft-resistance, and locking requirements;
- **Quantity-distance (Q-D) siting:** Magazine placement will comply with ATF Q-D tables to maintain required separation distances from inhabited buildings, public roads, and other receptors;
- **Security and access control:** Storage areas will be secured with controlled access, locks, and inventory accountability systems. Only authorized, trained personnel will have access; and
- **Inventory and recordkeeping:** Daily inventory records and transaction logs will be maintained in accordance with ATF requirements to track explosives from receipt through use.

4.7.1.2 MSHA Compliance (30 CFR – Explosives Handling and Use)

Explosives use in underground and surface mining will comply with applicable provisions of 30 CFR, including but not limited to requirements for safe handling, storage, transportation, and blasting practices. Key controls include:

- **Qualified personnel and training:** Explosives will be handled and used only by trained and authorized personnel, including certified blasters where required. Training will address safe handling, misfire procedures, and emergency response.
- **Separation and compatibility:** Detonators, primers, and bulk explosives will be stored and transported separately in accordance with MSHA requirements to prevent accidental initiation.
- **Transportation controls:** Explosives will be transported in approved vehicles or containers designed to prevent ignition, damage, or unauthorized access. Vehicles will be properly placarded and operated in accordance with MSHA and DOT requirements.
- **Loading and blasting procedures:** Loading of blast holes will follow controlled procedures to prevent premature detonation, including restrictions on simultaneous operations, grounding where necessary, and protection from static electricity or stray currents.
- **Misfire management:** Misfires will be handled in accordance with MSHA regulations, including evacuation of affected areas, controlled re-entry, and documentation of corrective actions.
- **Inspection and maintenance:** Explosives storage areas, magazines, and handling equipment will be inspected at required intervals to comply with safety standards and to identify potential hazards.

4.7.1.3 Hazardous Materials Storage (Non-Explosives)

Hazardous materials (including fuels, reagents, and process chemicals) will be stored in designated facilities incorporating:

- Secondary containment systems designed to prevent releases to soil, surface water, or groundwater, consistent with 20.6.2 NMAC;
- Segregation of incompatible materials in accordance with applicable safety and hazardous materials management standards;
- Proper labeling and hazard communication consistent with federal and state requirements; and
- Integration with SPCC controls (40 CFR Part 112) for petroleum products.

4.7.1.4 Environmental Protection Integration

Explosives and hazardous materials storage and handling practices will be implemented to verify compliance with:

- 19.10 NMAC (Mining Act performance standards) for protection of public health and the environment;
- 20.6.2 NMAC (Groundwater Quality) through prevention of releases and use of secondary containment; and
- 20.2 NMAC (Air Quality) through minimization of emissions associated with handling, blasting, and material disturbance.

Storage and handling areas will be designed to prevent releases that could impact soil, surface water, or groundwater and will be incorporated into the Project's Spill Prevention, Control, and Countermeasures (SPCC) Plan and emergency response procedures.

4.7.2 Transport of Hazardous Substances

Vehicle and equipment fluids such as diesel fuel and gasoline will be stored in bulk metal tanks located along the main haul access road at the mine and placed on secondary containment designed to hold the volume of the largest single container plus an additional 10% of the total volume of tanks, or the volume of the 25-year, 24-hour storm event, whichever is greater. Equipment will be fueled either by driving up to a bulk fuel dispenser and fueling the vehicle/equipment, or a designated fuel vehicle (i.e., lube truck) will fill up at the bulk fuel dispenser and take fuel to each individual piece of heavy equipment. The fuel tanks will be filled periodically, as needed, by a third-party fuel delivery company.

Vehicle and equipment fluids such as antifreeze, petroleum-based grease, hydraulic fluid, motor oil and cleaning solvents will be stored in metal 55-gallon drums, or equivalent, as received from the manufacturer or vendor. These materials will be stored within maintenance facilities located outside of NFS lands, where vehicle and equipment maintenance and repairs will be performed. A limited storage of these materials will be maintained and will be replaced, as needed. Drums will be stored within secondary containment and under cover to prevent precipitation contact and contain potential releases. Storage and handling of these materials will be conducted in accordance with the site-specific SPCC Plan.

Spent or used fluids will be collected and stored in labeled drums during routine fluid change and maintenance intervals. The spent fluids will be collected by a licensed recycler.

Mine water treatment plant reagents/chemical additives will be stored at the mine water treatment facility and used as needed in the mine water treatment processing stream. Reagents will be contained in manufacturer-supplied containers and stored in a secured area of the mine water treatment building. The chemical usage will be monitored and the results used to order quantities of chemicals from local suppliers.

Detonators, primers, and stick and bulk powder will be stored in separate approved explosives magazines. Explosives will be stored either in the underground magazines and/or the surface explosives magazines. The main explosive planned for use is ammonium-nitrate fuel oil (ANFO), which will be supplied in 50-lb bags or in larger capacity tote bags as required. There will however still be a requirement for packaged slurry explosives and "stick" powder for wet holes or for boosting the ANFO in some applications. These are easily provided by the explosives manufacturer in containers, which will be stored and inventoried. It is assumed that the stopes will be sufficiently dewatered to allow for ANFO to be used as the primary blasting agent, however this requires further study. Explosives will be handled, stored, and used in accordance with applicable federal and state regulations. Required ATF and State permits or registrations will be obtained prior to commencement of operations.

A security fence will be installed surrounding storage tanks, maintenance buildings, and the water treatment facility where hazardous materials and toxic substances will be used and stored. Hazardous materials and toxic substances will be identified and properly labeled to comply with state and federal requirements.

4.7.3 Hazardous Material Spill Prevention

Spill Prevention, Control, and Countermeasures (SPCC) Plan

The Project will implement and maintain an SPCC Plan consistent with 40 CFR Part 112 and applicable state requirements. The SPCC Plan is a key compliance document intended to prevent

discharges to waters of the United States and to protect groundwater quality consistent with 20.6.2 NMAC.

The SPCC Plan includes:

- Inventory and storage controls for petroleum products and hazardous materials;
- Inspection and preventative maintenance procedures;
- Secondary containment requirements; and
- Spill response, reporting, and corrective action protocols.

The SPCC Plan will be maintained on-site, periodically updated, and made available to regulatory agencies upon request. Implementation of the SPCC Plan is an enforceable component of the Project design and may be incorporated by reference into NEPA documentation and the administrative record.

4.7.3.1 Refueling Operations and Controls

Refueling will occur primarily at designated fueling areas on private land to minimize environmental risk. Field refueling will utilize portable systems to meet applicable safety standards and will be conducted over secondary containment capable of capturing releases.

Spill kits will be maintained at fueling locations. Used absorbent materials will be containerized and managed in accordance with applicable solid or hazardous waste requirements. Refueling procedures are designed to prevent releases that could result in groundwater contamination (20.6.2 NMAC) or air quality impacts from volatilization (20.2 NMAC).

4.7.3.2 Fuel Storage and Secondary Containment Design

Petroleum products will be stored in compatible, labeled containers. Containers with capacities of 55 gallons or greater will be equipped with secondary containment designed to hold at least 110 percent of the largest container volume, with sufficient freeboard to contain precipitation from a 25-year, 24-hour storm event.

Containment systems will be designed, constructed, and maintained to prevent releases to soil and groundwater, consistent with 19.10 NMAC performance standards and 20.6.2 NMAC discharge prevention requirements.

Storage areas will be subject to routine inspection, and deficiencies will be corrected promptly. Spill response equipment will be maintained in operational condition.

Vehicle and equipment maintenance procedures and practices will be designed to minimize or eliminate the discharge of spills and leaks to site waterways. These procedures and practices apply to the site preparation and mining operations activities:

- Site vehicles including drill rigs and support equipment will be monitored daily during equipment pre-shift inspections and prior to each use for leaks and will receive regular preventive maintenance to reduce the potential of leaks. Vehicles with leaks will be repaired immediately or will be moved from the immediate work location to the maintenance building if further maintenance is required;
- Drip pans or absorbent pads will be used during vehicle and equipment maintenance work.
- Absorbent spill clean-up materials will be available onsite and will be disposed of properly after use; and
- Used oils, fluids, lubricants, and spill clean-up materials will be disposed of immediately and properly.

Equipment pre-shift inspections will consist of informal daily examinations and periodic condition inspections of the equipment. Additional inspections will be performed if a malfunction or leak occurs. Designated field personnel will conduct informal daily inspections of the support vehicles and associated equipment. Personnel will check equipment for leaks and proper operation; examine generators and pumps to verify proper function and check for damage and leakage; look for accumulation of water, oil, or other material at the work sites; and look for stained or discolored soil in and around the vehicles and equipment. Inspections of certain equipment will be performed in accordance with manufacturer's specifications, where applicable. Inspections will be documented on inspection logs; these logs will be signed by the onsite Project Manager, or designee, and maintained in the field files.

Brittle fracture evaluation is conducted by an experienced person for field-constructed aboveground tanks that undergo repair, alteration, reconstruction, or change in service. Brittle fractures may cause sudden and catastrophic tank failure, resulting in loss of product and potentially serious damage to the environment. Aboveground tanks will be evaluated for brittle fracture in accordance with industry standards and the site-specific SPCC Plan. Inspection frequency and procedures will be established in the SPCC Plan, and inspections will be documented and maintained in accordance with applicable requirements.

4.7.4 Spill Containment Measures

The following summarizes the actions that must be taken in the event of a discharge, including the distribution of responsibilities among individuals:

- Field personnel must shut off ignition sources, if safe to do so, including motors, electrical circuits, and open flames;
- Field personnel should determine the source of the discharge, and if safe to do so, immediately shut off the source of the discharge;
- Field personnel should use resources available at the Project site to stop the spilled material from spreading, if safe to do so. Depending on the location and size of the discharge, sorbent material may be placed in the path of the discharge, or earthen berms or trenches constructed;
- In the event of a discharge, field personnel must immediately contact the onsite Safety Officer, who will direct the response and cleanup activities;
- The onsite Project Manager will verify that proper notification procedures are followed and related documentation is completely and accurately filled out; and

- Potentially harmful discharge notifications, as discussed below, must be completed immediately upon discovering the discharge. The onsite Project Manager must be contacted immediately so that timely notifications can be made. If the Project Manager is not available, the Safety Officer will begin notification. The Project Manager must also verify that written notifications, if needed, are submitted to the appropriate agencies.

The following summarizes potential discharge scenarios during operations and scenario-specific containment procedures:

- Fueling/maintenance of earth moving equipment – piping, hoses, valves, and fittings can leak, rupture, or overfill within the local fueling area. Drip pans or absorbed pads will be used for containment as well as curbs or berms around the designated fueling area (if applicable);
- Fueling/maintenance of equipment/support vehicles – piping, hoses, valves, and fittings can leak, rupture, or overfill within the local fueling area. Drip pans or absorbed pads will be used for containment as well as curbs or berms around the designated fueling area (if applicable); and
- Generator maintenance – generators can leak or develop valve failure within the local generator area. Drip pans or absorbent pads will be used for containment.

4.7.5 Spill Notification Procedures

Several parties must be contacted in the event of a reportable quantity (RQ) discharge. Discharges should initially be reported to the Project Manager, who is then responsible for verifying that subsequent required discharge or spill notifications have been made.

In addition, spill notifications will be provided to the USFS and MMD project managers, as applicable, in accordance with permit conditions and agency coordination requirements.

The U.S. Environmental Protection Agency (EPA) requires that discharges of oil in quantities that may be harmful to public health or welfare, or to the environment, be reported to the federal government. Quantities that may be harmful include those that:

- Violate applicable water quality standards;
- Cause a film or "sheen" upon, or discoloration of the surface of the water or adjoining shorelines; or
- Cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines.

For any potentially harmful discharge that reaches navigable waters, or threatens to reach navigable waters, immediate notification must be made to the National Response Center (800-424-8802) and to the EPA Region 6 office (800-887-6063). The following information should be reported, if known:

- Name, location, organization, and telephone number of the person making the report;
- Name and address of the party responsible for the incident;
- Date and time of the incident;
- Location of the incident;
- Source and cause of the release or spill;

- Types of material(s) released or spilled;
- Quantity of materials released or spilled;
- Danger or threat posed by the release or spill;
- Number and types of injuries (if any);
- Weather conditions at the incident location; and
- Any other information that may help emergency personnel respond to the incident.

In the event of a discharge that may result in an emergency situation, the Project Manager or designee must verbally notify the New Mexico Environment Department (NMED) Petroleum Storage Tank Bureau at 505-827-9329, 24-hours a day, as soon as possible after discovery of the discharge. Any amount of any material as may, with reasonable probability, injure or be detrimental to human health, animal or plant life, or property, or may unreasonably interfere with the public welfare or the use of property must be reported. This includes chemical, biohazardous, petroleum products, and sewage spills and incidents. In addition to recent spills, the discovery of evidence of previous unauthorized discharges, such as contaminated soil or ground water, also must be reported.

In the event of a discharge that does not present an emergency situation, verbal notification must be made to the NMED Petroleum Storage Tank Bureau at 505-476-6000 during normal business hours or at 866-428-6535 to leave a voice mail 24 hours a day.

A written notification must be made to the EPA for any single discharge of oil of more than 1,000 gallons, or for two discharges of one barrel (42 gallons) of oil to navigable waters or an adjoining shoreline waterway in any 12-month period. This written notification must be made within 60 days of the qualifying discharge; a copy will be sent to NMED. This reporting requirement is separate and in addition to the verbal reporting procedures discussed in the paragraphs above. Written notification to the EPA will be sent to:

SPCC/FRP Coordinator
U.S. EPA - Region VI (6SF-RP)
1445 Ross Ave.
Dallas, TX 75202-2733
(214) 665-6489

4.7.6 Spill Cleanup and Disposal

Spill response materials will be available to and accessible by RHR and subcontractor personnel. Spill kits will be maintained on appropriate equipment and vehicles, and additional response materials may be stored in an onsite trailer or other designated staging area. The location of the staging area will be identified prior to operations and included in the SPCC Plan, as applicable. The response materials may include:

- Absorbent socks;
- "Floor-dry" loose absorbent material;
- Absorbent pads;
- Nitrile gloves;
- Neoprene gloves; and
- Non-sparking shovels.

RHR field operations personnel will regularly check the materials to verify that used material is replenished.

The cleanup contractor will handle the disposal of any recovered product, contaminated soil, contaminated materials and equipment, decontamination solutions, sorbents, and spent chemicals collected during a response to a discharge incident. Any recovered product that can be recycled on site will be stored separately. Any recovered product not deemed suitable for onsite recycling will be disposed of with the rest of the waste collected during the response efforts.

Spill response actions will be conducted by trained site personnel using on-site equipment and materials in accordance with the SPCC Plan. Contractors will not be routinely stationed on-site for spill response; however, qualified and licensed contractors will be utilized, as needed, for the transport and disposal of spill-related waste materials at appropriately permitted facilities.

4.8 Public Health and Safety

4.8.1 Emergency Management and Response

The Project will develop, implement, and maintain an Emergency and Crisis Management Plan (ECMP) to address all phases of underground uranium mining and associated surface operations. The ECMP will be designed to minimize risks to workers, the public, and the environment and will be consistent with applicable requirements of the Mine Safety and Health Administration, the U.S. Environmental Protection Agency, and the New Mexico Environment Department, as well as other applicable federal and state regulatory frameworks governing uranium mining.

The ECMP will include, but not be limited to, the following components:

- **Emergency Response Organization and Responsibilities:** A designated competent person will be present on each shift with authority to direct emergency response actions. Roles and responsibilities for mine personnel, contractors, and emergency responders will be clearly defined.
- **Communication Systems:** Redundant and reliable communication systems will be maintained between underground workings, ventilation shafts, and surface facilities (including access roads, haul roads, and stockpile areas) to support effective coordination during emergency events.
- **Medical Response and First Aid:** Trained first aid personnel will be available on all shifts. First aid stations and supplies will be maintained in underground and surface work areas. The Project will coordinate with local emergency medical services in McKinley County, New Mexico, and maintain procedures for ground and air medical evacuation.
- **Mine Rescue and Refuge:** Underground mine rescue capability will be established in compliance with 30 CFR Part 49. Refuge chambers will be installed in underground workings and equipped with breathable air, communication systems, and emergency supplies.
- **Radiological Emergency Response:** The ECMP will include procedures specific to uranium mining hazards, including:
 - Response to elevated radon or radon progeny concentrations in underground workings or ventilation exhaust;
 - Control and isolation of areas with potential radiological contamination;
 - Use of ventilation controls and operational adjustments to reduce airborne radionuclide concentrations;
 - Personnel evacuation protocols based on radiological monitoring thresholds;

- Deployment of radiation detection and monitoring equipment; and
- Decontamination procedures for personnel, equipment, and affected areas.
- **Hazardous Materials and Chemical Safety:** Emergency procedures will address spills or releases of fuels, reagents, or other hazardous materials, including appropriate containment, neutralization, and cleanup measures.
- **Training and Drills:** Personnel will receive initial and annual refresher training on emergency response procedures, including radiological hazard awareness. Periodic emergency response drills, including mine rescue and radiological scenarios, will be conducted to confirm preparedness.
- **Regulatory Compliance:** Emergency planning and response measures will comply with applicable requirements under the Clean Air Act (including radionuclide standards under NESHAP Subpart B), MSHA regulations, and relevant New Mexico regulations. Where applicable, the Project will coordinate with federal and state agencies with jurisdiction over uranium mining and radiological protection.

4.8.2 Site Security and Restricted Access

The Project will implement access control and site security measures to protect public safety, prevent unauthorized entry, and minimize the potential for exposure to operational or radiological hazards.

Mitigation measures will include:

- **Controlled Access Points:** Access to the Project area will be limited to authorized personnel through designated entry points with gates and, where appropriate, staffed security checkpoints.
- **Fencing and Physical Barriers:** Fencing will be installed around active surface facilities, including ventilation shafts, ore stockpiles, water management infrastructure, and other operational areas. Fencing design will be consistent with applicable land management requirements and will consider wildlife permeability where appropriate.
- **Signage:** Warning signs, including “No Trespassing,” hazard notifications, and radiological postings (where applicable), will be installed at regular intervals along facility boundaries and at access points in accordance with applicable federal and state requirements.
- **Radiological Controls:** Areas with the potential for radiological exposure, including ventilation exhaust points and ore handling areas, will be clearly identified and, where necessary, restricted to trained personnel. Access controls will be implemented consistently with applicable radiation protection standards.
- **Security Monitoring and Patrols:** Routine security patrols will be conducted to monitor site conditions, inspect fencing and access points, and deter unauthorized entry. Monitoring systems (e.g., cameras) may be used at key locations.
- **Administrative Controls for Remote Features:** Dispersed facilities such as monitoring wells or exploration areas may not be fully fenced; however, signage, barriers, and administrative controls will be used to maintain public safety.
- **Coordination with Land Management Agencies:** Access restrictions will be implemented in coordination with applicable federal, state, or tribal land management

agencies, as appropriate. Public access to surrounding lands and roadways will be maintained except where restrictions are necessary for safety.

4.8.3 Prevention and Control of Fire (Private, State, and National Forest System Lands)

4.8.3.1 Employee Training and Response Protocols

Employees, contractors, and subcontractors associated with the Project will receive site-specific fire prevention and response training prior to commencing work. Training will be tailored to the arid, fuel-limited but highly fire-prone conditions of northwestern New Mexico, where ignition risk is elevated due to dry vegetation, high winds, and seasonal lightning activity.

Personnel will be trained in basic fire suppression techniques, proper use of fire extinguishers, and early fire detection and reporting protocols. This training will be supplemented with instruction on the use of site-specific fire suppression infrastructure, including hydrants, water trucks, and mobile suppression systems.

Emergency response coordination will be conducted with appropriate agencies, including the U.S. Forest Service (for National Forest System lands), the New Mexico State Land Office (for state trust lands), and local fire protection authorities (e.g., Cibola County and nearby communities such as Milan and Grants). Coordination outcomes will be incorporated into the Project Emergency Response Plan (ERP), which will define notification protocols, jurisdictional responsibilities, and unified command procedures across federal, state, and private land boundaries.

Fire prevention procedures will include, at a minimum:

- A standing requirement to obtain an “authority to work” permit for hot work (e.g., welding, cutting, brazing, or spark-producing activities).
- Precautionary controls for blasting and welding operations, including pre-work area inspections and post-work fire watch requirements.
- Requirements for mechanized equipment (e.g., use of spark arrestors, routine inspection for heat buildup or fuel leaks) to minimize ignition risk.
- Restrictions on vehicle parking in brush, grass, or undeveloped wildland areas; parking will be limited to designated roadways or cleared areas.
- Implementation of a fire watch to monitor active and recently completed work areas for ignition sources (e.g., sparks, smoldering material).
- Designation of a competent person (supervisory personnel or authorized agent) responsible for ensuring fire prevention controls are implemented and effective.
- Implementation of a lightning trigger-action-response plan, including weather monitoring and lightning detection systems, with site-wide communication via radio and/or digital alert systems.

Given the Project’s location within a high wildfire risk landscape, training and procedures will emphasize rapid response, early detection, and immediate communication across all land ownership jurisdictions.

4.8.3.2 Equipment

Adequate fire prevention and suppression equipment will be maintained and strategically distributed across Project areas, including facilities located on National Forest System lands, State Trust lands, and private lands. Equipment deployment will reflect access constraints, fuel loading conditions, and proximity to sensitive resources.

A fire water system will be installed for surface facilities, including maintenance shops, fuel storage areas, welding bays, administrative buildings, and storage areas. Where applicable, underground facilities will be equipped with firewater storage tanks located adjacent to high-risk areas. These systems will include alarm mechanisms triggered during pump use (including testing) to verify system integrity and availability during emergency conditions.

Additional fire protection measures will include:

- Fire suppression systems in high-risk facilities (e.g., workshops, fuel/lube areas).
- Fire-rated doors and compartmentalization in underground or enclosed work areas, as applicable.
- Fire extinguishers and first-aid kits installed on all mobile and light-duty vehicles.
- Installation of spark arrestors on all internal combustion engines, commensurate with operational risk.
- Use of spark shields or fire-resistant barriers during hot work conducted near vegetated or wildland areas.
- Deployment of water trucks and/or portable water tanks for dust control and fire suppression in areas where vegetation disturbance cannot be avoided.

Equipment standards will be consistent across land ownership types to verify uniform fire prevention and response capability throughout the Project footprint.

4.8.3.3 Wildfire Response

The Project is located in a semi-arid, fire-adapted ecosystem where wildfire occurrence is strongly influenced by seasonal climatic conditions. Wildfire risk is typically elevated during:

- Spring (April–June): Characterized by low humidity, dry fine fuels (e.g., grasses), and high winds.
- Late summer to fall (September–October): Following curing of vegetation after the monsoon season.

Lightning associated with the summer monsoon season represents a significant natural ignition source, while human-caused ignitions may occur from equipment use, vehicles, or nearby recreational activities.

Wildfire behavior in the Project area is strongly wind-driven, with rapid rates of spread possible under high wind conditions. Accordingly, fire prevention and response planning will prioritize early detection, rapid initial attack, and coordination with external response agencies.

Smoke from wildfires presents additional risks, including:

- Reduced air quality and respiratory hazards for personnel;
- Impacts to visibility and safe operation of vehicles and equipment;

Potential interference with engines, generators, and ventilation systems (including any underground workings, if applicable).

The Project will implement a site-specific Wildfire Trigger-Action-Response Plan, which will:

- Establish trigger thresholds (e.g., Red Flag Warnings, proximity of wildfire, lightning events);
- Define response actions, including work stoppage, equipment shutdown, and personnel mobilization;
- Identify evacuation and/or shelter-in-place criteria;
- Establish communication protocols across Project areas and land jurisdictions;
- Define coordination procedures with the U.S. Forest Service, state agencies, and local fire departments;
- Provide clear roles and responsibilities for site personnel, including supervisors, safety staff, security, and emergency response teams;

Define “all-clear” criteria for resumption of operations.

Given the Project’s distributed footprint across federal, state, and private lands, wildfire response planning will confirm seamless coordination across jurisdictional boundaries and compliance with applicable agency requirements.

4.8.3.4 Fire Control Design and Infrastructure

The Project will incorporate engineered fire prevention and suppression systems across operational areas to address the elevated wildfire risk associated with the semi-arid environment of northwestern New Mexico. Fire control infrastructure will be installed at surface and, where applicable, subsurface facilities, including maintenance shops, fuel and lubricant storage areas, welding bays, administrative buildings, and material storage areas.

Fire water delivery systems will be designed to provide reliable suppression capability, including dedicated storage located proximate to higher-risk operational areas. These systems will include monitoring and alarm features that activate upon pump operation (including routine testing) to verify system readiness and prevent unintended use.

Enclosed or high-risk work areas will incorporate passive and active fire protection measures such as fire-rated separations and fixed suppression systems. Fire protection infrastructure will remain operational through closure until combustible materials and equipment have been removed.

Design and implementation of fire control systems will be conducted in compliance with applicable federal and state requirements, including 36 CFR 228.8 (fire prevention and control on National Forest System lands), 36 CFR 261.5 (fire restrictions), applicable MSHA safety standards (30 CFR), and relevant provisions of the New Mexico Administrative Code (e.g., 19.20 NMAC – Forest and Watershed Protection).

4.8.3.5 Emergency Preparedness and Mobile Equipment Readiness

Mobile and stationary equipment will be outfitted with fire suppression capabilities commensurate with operational risk. Heavy equipment will include integrated or mounted suppression systems or appropriately rated extinguishers, consistent with 30 CFR 57 Subpart M (fire prevention and control in metal and nonmetal mines).

Light-duty vehicles will, at a minimum, be equipped with:

- A properly rated fire extinguisher;
- A round-nosed shovel suitable for incipient wildfire response; and
- A first-aid kit.
- Equipment distribution will demonstrate readiness across all land ownerships in accordance with 36 CFR 228.8(a) and state fire protection expectations under 19.20 NMAC.

4.8.3.6 Equipment Inspection and Maintenance

Equipment will be inspected, maintained, and repaired to demonstrate safe operation, with emphasis on minimizing ignition risks associated with mechanical failure, overheating, or fuel system leaks.

Preventative maintenance programs will be implemented consistently with 30 CFR 57.14100 (inspection and maintenance of machinery and equipment) and general duty requirements for fire prevention under 36 CFR 228.8.

4.8.3.7 Employee Training and Certification

Personnel will maintain required training and certifications, including annual training in accordance with 30 CFR Part 48 (MSHA training requirements).

Prior to commencing work, employees, contractors, and subcontractors will receive site-specific fire prevention and response training. Training will include wildfire awareness, suppression techniques, extinguisher use, and operation of site fire control systems.

Training programs will support compliance with 30 CFR 48, 36 CFR 228.8 (operator responsibility for fire control), and applicable state fire prevention provisions under 19.20 NMAC.

4.8.3.8 Firearms Prohibition

Firearms and other weapons are prohibited within the Project area. This measure supports overall site safety and reduces potential ignition sources and safety risks in accordance with general public safety provisions under 36 CFR 261.8 (prohibitions on National Forest System lands) and operator control responsibilities under 36 CFR 228.8.

4.8.3.9 Emergency Planning and Agency Coordination

A comprehensive Emergency Response Plan (ERP) will be implemented and maintained to address fire-related incidents. The ERP will be developed in coordination with the U.S. Forest Service, the New Mexico State Land Office, and local fire protection authorities.

The ERP will establish emergency notification procedures, define roles and responsibilities under a unified command structure, and verify coordination across federal, state, and private lands.

Emergency planning will be consistent with 36 CFR 228.8 (fire control and suppression requirements), 36 CFR 261 (prohibitions and emergency closures), and applicable state emergency and wildfire response coordination requirements under 19.20 NMAC.

4.8.3.10 Hot Work Authorization and Controls

Hot work activities will be conducted under a formal permitting system (authority-to-work). This system will make sure that fire risk conditions are evaluated, appropriate controls are implemented, and fire watch personnel are assigned during and after work completion.

Controls will include vegetation clearance, spark containment, and post-work inspection to confirm no residual ignition sources remain. Restrictions on equipment operation and vehicle parking in vegetated areas will also be enforced.

These requirements are consistent with 36 CFR 261.5(c) (restrictions on fire use and ignition sources), 36 CFR 228.8, and 30 CFR 57.4600 (welding, cutting, and use of open flames).

4.8.3.11 Lightning Detection and Response Plan

A lightning trigger-action-response plan will be implemented to address lightning-induced wildfire risk. The plan will include real-time weather monitoring, defined operational thresholds for work suspension, and site-wide communication protocols.

This plan is consistent with operator responsibility to prevent and control fires under 36 CFR 228.8, emergency response considerations under 36 CFR 261, and applicable state wildfire prevention provisions under 19.20 NMAC.

4.8.3.12 Spark and Ignition Source Prevention

Internal combustion engines will be equipped with spark arrestors, and spark shielding or equivalent controls will be used during hot work near vegetation. Where disturbance of vegetated areas cannot be avoided, pre-wetting or other mitigation measures will be implemented.

These measures are consistent with 36 CFR 261.52 (fire restrictions and spark arrestor requirements when imposed), 36 CFR 228.8, and 30 CFR 57.4600.

4.8.3.13 Traffic Management and Speed Control

Vehicle speeds on Project roads will be controlled through signage and monitoring. Speed limits and traffic controls are intended to reduce ignition risks (e.g., hot exhaust contact with vegetation), minimize dust, and reduce collision risk.

Traffic management measures will support compliance with 36 CFR 261.54 (use of roads and trails), 36 CFR 228.8, and general safety obligations under 30 CFR 57 Subpart M and 57.9100 (traffic rules).

5.0 Post-Mining Land Use -19.10.6 602 D.(15)(f)

(f) If a post-mining land use is proposed, a detailed description of how the disturbed area will be reclaimed to achieve that use and written approval of the surface owner for the proposed use.

RHR proposes to reclaim the surface areas of the mine Project area that are disturbed by the mining operation to the approved post-mining land use of grazing. Sections 9, 10, and 11 of the Project area are owned by the federal government and administered by the USFS; RHR holds the mining claims in Section 9 and 10, with some overlapping into Section 11. The Project is located within the Cibola National Forest and will be conducted in a manner consistent with the 2022 Cibola National Forest Land and Resource Management Plan (USFS, 2022). Proposed post-mining land use will be coordinated with the USFS to confirm consistency with current plan direction and applicable management allocations. **Appendix D** contains a previously issued letter from Ms. Nancy Rose, former Forest Supervisor of the Cibola National Forest and National Grasslands, approving RHR's proposed grazing post-mining land use for these sections. This approval will be updated or supplemented, as appropriate, in coordination with the USFS.

Section 16 is owned by the state of New Mexico and administered by the State Land Office (SLO). RHR holds a general mining lease for the section while the Fernandez Company, owned by Lee Ranch, holds the grazing lease. **Appendix E** includes a letter from the New Mexico SLO approving RHR's grazing proposed post-mining land use for Section 16.

The Post Mining Land Use (PMLU) of grazing will be achieved through the successful revegetation of the areas disturbed by the RHR mining operation as described in more detail herein. The reclaimed area will be managed until a viable, self-sustaining vegetative community is established which will support livestock grazing and is compatible with ecological functions, including the establishment of native plant communities that provide forage for livestock and wildlife. At the request of the landowner(s) some roads and structures may be left to facilitate post-mining land management goals.

5.1.1 Treated-Water Discharge Cessation

Prior to permanent cessation of mine dewatering and treated-water discharge, RHR will evaluate the transition from active discharge to the post-mining water-management condition.

The evaluation will address:

- anticipated timing and duration of discharge cessation;
- projected groundwater recovery;
- anticipated changes in discharge and receiving-water conditions;
- water-quality monitoring requirements;
- receiving-channel conditions;
- sediment and constituent accumulation where relevant;

- continued operation or decommissioning of water-management facilities; and
- post-closure monitoring and contingency requirements.

The final closure and cessation plan will be consistent with applicable regulatory requirements and approved by the applicable agencies where approval is required.

6.0 Proposed Reclamation Plan -19.10.6 602 D.(15)(g)

The proposed Reclamation Plan has been developed consistent with the requirements of Title 19, Natural Resources and Wildlife, Chapter 10, Non-Coal Mining, Part 6, New Mining Operations and relevant sections of MMD Guidelines. Those guidelines include *Guidance Document for Part 6 New Mining Operations (NM-EMNRD 2010)* and *Joint Guidance for Meeting Radiation Criteria Levels and Reclamation at New Uranium Mining Operations (NM-EMNRD 2016)*. Sections 6.0 and 7.0 are organized to address regulations developed under Part 6, with each requirement listed and addressed here. The proposed surface facilities of the mine have been located to avoid eligible archaeological sites wherever possible. The proposed Reclamation Plan has also been developed with the goal of minimizing potential impacts to such cultural resources.

The following sections address NMAC requirements of 19.10.6.602.D.(15)(h) through (k), 19.10.6.603.A through H, and NMAC 19.10.6.605.F.

6.1 Description of the Proposed Reclamation Plan NMAC -19.10.6 602 D.(15)(g) and NM Mining Act 69-36-7(H)(4)

A description of the proposed reclamation plan, including a detailed description of how the disturbed area will be reclaimed to meet the requirements of Section 69-36-7(H)4 and the performance and reclamation standards and requirements of this Part.

The proposed Reclamation Plan provides a detailed description of the processes to be followed to reclaim areas disturbed by the Roca Honda Mine to meet the requirements of the above cited regulations and Mining Act Section, and the performance and reclamation standards required by this Part. The proposed Reclamation Plan includes performance of a post mining radiological survey of the facilities footprint in compliance with 19.10.6.603.C.(1)(f), and the joint guidance document referenced in Section 6.0 to identify and clean up potential radiological contamination. **Appendix F**, Post Mine Radiological Surveys Plan (Survey Plan), contains the details of the surveys conducted in 2013. Many aspects of the 2013 Survey Plan are consistent with the guidelines established in the 2016 joint guidance document. However, several of the suggested cleanup criteria in the guidance document pertain to licensed facilities such as ore milling operations, uranium mill tailings, etc., which will not be a part of the planned facilities at the mine. RHR is committed to mitigating mine site radiation levels to the State of New Mexico Radiation Cleanup Criteria, where applicable.

Section 3.0 provides a detailed description and design drawings for the construction of the mine surface facilities and the stockpile areas for the excavated soils and rock. To meet the requirements of the NMAC and NM Mining Act Closeout Plan Guidelines for Existing Mines (NMMA, 1996), RHR will recontour disturbed areas utilizing geomorphic design principles to reestablish the general landforms of the area, and to provide for stable configurations that will minimize erosion and provide for successful reclamation. Reclamation activities on National Forest Service (NFS) lands will also be conducted in accordance with applicable U.S. Forest Service regulations and policies, including 36 CFR 228 Subpart A (Surface Resources), the Cibola National Forest Land Management Plan (USFS, 2022), and applicable guidance in Forest Service Manual 2800. The Cibola National Forest Land Management Plan (2022) provides for multiple land uses of the forest, including grazing, and establishes management direction, desired conditions, standards, and guidelines applicable to National Forest System lands within the Project area. The Project has been designed to be consistent with applicable plan components.

The Preliminary Reclamation Cost Estimates are included in **Appendix G**. The proposed Reclamation Plan outlines procedures for preparing subgrade materials, applying and conditioning topsoil for seeding, and implementing seeding and mulching activities. The revegetation strategy includes the use of plant species specifically selected for their compatibility with local soils, the regional climate conditions of the Project area and the intended post-mining grazing use. For National Forest System lands, species selection and revegetation approaches will also consider vegetation desired conditions identified in the Cibola National Forest Land Management Plan (USFS, 2022) and applicable ecological site information.

Section 7.7 describes the revegetation plans in detail. The seed mix shown in that section is a mixture of cool and warm season species of grasses, forbs, and shrubs that have demonstrated the ability to re-establish in mine reclamation soils and support livestock grazing. Each species is known for its palatability to livestock and wildlife, its high nutritive value for herbivores, and its differing optimal growth period (e.g. warm season versus cool season), which makes the mix supportive of the post-mining land use of grazing on a year-round basis. After seeding, the areas will be managed to control access to allow for re-establishment of the vegetative community that will support livestock grazing on a sustainable basis.

The seed mix described in Section 7.7 consists of native or locally adapted, non-invasive species (certified weed-free) suitable for reclamation in the Project area. Soil preparation and amendment practices, including placement of salvaged topsoil and sub-base materials and other soil conditioning measures if needed, will be used to improve revegetation success. Revegetation success criteria, monitoring procedures, and maintenance requirements are described in Section 7.7. Irrigation of reclaimed areas is not anticipated, as the selected species are adapted to local conditions and are expected to establish under natural precipitation.

Surface water features affected by construction activities, including channels, drainage crossings, floodplain areas, utility corridor crossings, and other temporary or permanent Project infrastructure, will be reclaimed to restore stable drainage patterns and geomorphic characteristics consistent with surrounding conditions. Final reclamation of these features will be based on the final design of the Project's surface water management facilities and drainage crossings as approved through the applicable permitting process. Reclamation will include removal of temporary crossings, diversion structures, culverts, and other stormwater control features that are no longer required, regrading disturbed channels and floodplain areas to approximate pre-disturbance contours where practicable, stabilization using erosion control measures where necessary to ensure long-term channel stability, and revegetation using the approved native seed mix. Permanent drainage stabilization features may be retained where demonstrated to be necessary for long-term channel stability and approved by the appropriate regulatory agencies. The specific configuration of individual drainage crossings, diversion structures, culverts, and other stormwater management features will be finalized during detailed engineering and reflected in the final Surface Water Management Plan. The reclamation commitments described herein apply to those final facilities regardless of the final design configuration.

Utility corridors associated with permanent mine infrastructure and located within the common road and utility corridors described in Sections 3.1.3 and 3.2.8 will be reclaimed following completion of operations unless retained pursuant to landowner agreement or regulatory authorization. Reclamation will generally include removal of unnecessary infrastructure, restoration of disturbed drainage features, regrading, redistribution of salvaged topsoil where available, erosion control, and revegetation consistent with surrounding landforms and the approved post-mining land use. Reclaimed areas will be monitored to evaluate revegetation success and surface stability. If reclamation measures are not successful within the anticipated

timeframe or do not meet revegetation success criteria, additional corrective actions such as reseedling, erosion control improvements, or additional stabilization measures will be implemented as necessary to achieve reclamation objectives.

Monitoring results will be used to evaluate channel stability, drainage function, erosion, sediment transport, and revegetation success. Where monitoring indicates reclamation objectives have not been achieved, additional grading, stabilization measures, erosion control, drainage improvements, or revegetation will be implemented until the applicable reclamation performance standards have been satisfied.

The following sub-sections summarize the major reclamation activities planned for the Project area following completion of mining activities. These activities are discussed generally in the order they will occur.

Reclamation of the entire mine, including placement of non-ore development rock remaining on the surface back underground, will be completed approximately six years after mining has been completed. Post-reclamation monitoring, maintenance, and evaluation of revegetation success will continue beyond this period, resulting in a total reclamation and closure duration of approximately 9.5 years.

6.1.1 Disposition of Non-Ore Development Rock Material

Production of non-ore development rock is described in more detail in Section 3.0. Generally, non-ore development rock is excavated and brought to the surface but contains limited recoverable uranium. Reclamation considerations of this material are dependent upon its ultimate disposition. The non-ore will either be stockpiled and hauled offsite for processing or returned to the underground mine workings for use as backfill.

Shaft excavation material refers to the material removed during shaft construction, extending from the surface of the ground to the shaft's final depth. This material will either be temporarily stockpiled on the surface within the Project area and returned to the mine for use as backfill or hauled off site for processing. RHR has committed to the NMED to perform the analysis of the excavated shaft material as a condition of an approved Discharge Plan to demonstrate that the material can be returned to the mine without impact to groundwater.

Excavated materials generated during construction of ventilation shafts differ from production shaft excavation. Ventilation shafts are anticipated to be constructed primarily using raise boring methods. Under this construction method, cuttings generated during reaming of the ventilation shaft fall directly into the underground mine workings where they are collected through the underground material handling system. These materials are not anticipated to require separate surface stockpiles at individual ventilation shaft locations. Where development rock generated underground is subsequently brought to the surface, it will be transported to the designated non-ore development rock stockpile facilities located within the primary surface facilities in Sections 16 and 17 or returned underground for use as backfill, as appropriate. No separate non-ore development rock stockpiles are proposed at individual ventilation shaft sites or other temporary drilling locations on National Forest System lands.

The non-ore development rock stockpile areas will be underlain with a synthetic liner system to prevent infiltration of water through potentially mineralized material. These temporary stockpile areas will be reclaimed by first excavating down below the original surface grade about 12 inches and that material will either be removed offsite or returned to the mine. The areas will then be

ripped to a depth of 12 to 18 inches, topsoil placed in a single lift, and the topsoil lightly ripped or disked to prepare the seedbed. The areas will then be seeded as described in Section 6.1.9.

Only stockpiles containing potentially mineralized non-ore development rock will be placed on lined pads. Stockpiles consisting of non-mineralized materials such as salvaged topsoil or sub-base rock will not require liners. The only planned surface non-ore development rock stockpiles associated with underground mine development are located within the primary surface facility areas in Sections 16 and 17 as shown on the Project figures. Temporary drill cuttings generated during development drilling, geotechnical drilling, groundwater monitoring well installation, or dewatering well construction may be temporarily contained within mud pits or designated containment areas located on individual drill pads for the duration of drilling activities. These temporary drilling features are managed in accordance with Section 3.1.6.3 and are not considered non-ore development rock stockpiles. Following completion of drilling, drill cuttings and associated materials will be characterized and managed in accordance with applicable regulatory requirements and Project procedures, and temporary mud pits and drill pads will be reclaimed. No separate long-term non-ore development rock stockpiles are proposed at ventilation shaft sites, dewatering well pads, or other temporary drilling locations on National Forest System lands.

6.1.2 Underground Equipment

An assessment of equipment and materials will be made to determine whether it is salvageable. Salvageable equipment in the mine will be dismantled and transferred to the surface via the production shaft hoisting system. Salvageable equipment and materials will be removed offsite for disposition.

Unsalvageable equipment and materials will be left in the mine. Fuels and hazardous materials will be removed from underground workings prior to closure; only inert or non-recoverable materials may remain, and these will not be expected to adversely affect groundwater quality.

6.1.3 Plugging Shafts, Wells and Drill Holes

Wells and drill holes will be plugged or abandoned in accordance with the OSE requirements per NMAC 19.27.4.31. Hole abandonment and reclamation procedures will begin immediately following geophysical logging of each drill hole. Surface casing (where used) would be removed and the drill rig used to seal holes with appropriate abandonment materials, including high-density bentonite clay and/or cement-based materials, as warranted by site conditions. The abandonment material will fill the hole from total depth to ten feet bgs, consistent with applicable requirements and site conditions. Where artesian or other saturated conditions are encountered, neat slurry or other approved sealing materials will be used, as appropriate, to prevent hydraulic communication between water-bearing zones. A cement plug will then be placed from the top of the mud column to a point two feet bgs. The top two feet of the hole will then be backfilled with topsoil to the original ground surface. Drill cuttings in the fenced mud pit will be allowed to dry until they can be covered in place and mounded to compensate for settlement over time. Compacted areas will be scarified or ripped and topsoil salvaged during drill pad preparation will be spread over the most heavily compacted areas.

Prior to completion of final reclamation of temporary drilling disturbances, radiological characterization and confirmation surveys will be conducted in accordance with the Project Sampling and Analysis Plan, the BDR, applicable NMED guidance, and other applicable regulatory requirements to demonstrate that reclamation objectives have been achieved.

Disturbed areas at the drill site will then be reclaimed by broadcasting an approved seed mixture over the areas and harrowing or mulching to cover the seed during the first favorable season. Large shrubs or trees removed during pad preparation will be cut into small pieces and scattered over the reclaimed drill site. Unless on-going access to the site or location is needed, the two-track trail or road to the site will also be reclaimed as described in Section 6.1.8.

Shafts will be plugged by installing an engineered concrete plug at a location below the ground surface. The plug will be approximately four feet in thickness poured, with reinforcing rebar, at a depth of approximately 10 feet below the shaft collar. After curing, the area above the plug will be backfilled with rock and soil material to within one foot of the surface. Another concrete plug will be poured at the surface, again with reinforcing rebar. Once cured, this surface plug will be covered with a 12-inch lift of subgrade soil material, and each lift wetted with water and wheel rolled for compaction.

6.1.4 Decommissioning of Retention Ponds

If water exists in the retention ponds (**Figure 4, Figure 5, Figure 6, Figure 7, and Figure 8**) when the ponds are scheduled for closure, the water will be transported via pipeline or truck to the WTP for treatment and release. Accumulated pond sediment will be sampled and analyzed to determine the mineralogy and radionuclide content of the material to determine the appropriate method of management and disposal. Synthetic liners will be removed and disposed of in mine workings, if available, or at a licensed landfill. Sub-liner materials that may be impacted by leaks will be handled in the same manner as accumulated pond sediment.

Consistent with clean closure principles applied to uranium mine facilities, RHR will implement sampling, monitoring, and material management measures to confirm protection of groundwater and compliance with applicable standards.

During operations, pond water and accumulated sediments will be periodically sampled and evaluated as required by applicable permits and to inform closure planning. At closure, impoundments will undergo a comprehensive evaluation including sampling of water (if present), sediments, liners, and underlying subgrade materials to characterize potential contaminants and determine appropriate disposition.

Closure of retention ponds will include removal of free liquids, excavation and testing of sediments, removal and testing of liners, and evaluation of underlying soils. Materials exceeding applicable cleanup criteria will be managed appropriately, including off-site disposal at licensed facilities where required or placement in engineered underground mine workings that are demonstrated to be protective and consistent with regulatory requirements.

Any materials placed underground will be limited to those that do not present a reasonable potential to impact groundwater, based on site-specific hydrogeologic conditions (e.g., depth to aquifer, low permeability host formations, and absence of hydraulic connectivity), consistent with clean closure standards requiring no reasonable probability of exceedance of groundwater quality standard.

Following reclamation, confirmation sampling (e.g., radiological and chemical) will be conducted to verify that cleanup criteria have been achieved and that no residual sources of contamination remain. Post-reclamation monitoring will be performed as required by permits or agencies to confirm that reclaimed areas do not pose a risk to human health, livestock, wildlife, or groundwater resources.

These measures verify that impoundment closure and material management are protective of aquifer systems, consistent with NMED requirements and clean closure objectives.

Earthen perimeter berms established as a part of pond construction will be regraded and used for backfilling voids left by pond excavation. Pond backfill will be placed in compacted lifts to promote structural stability, shaped to encourage positive drainage, and contoured to integrate seamlessly with the natural geomorphology of the surrounding landscape. While the regraded site may not exactly match the erosional and depositional characters of the surrounding terrain, the grading will be conducted to blend the reclaimed area so that it is representative of the geomorphological character of the area in general and will meet the geomorphic objective of a stable landform that is resistant to excessive erosion. The graded elevation will be approximately one foot lower than the final desired elevation to allow for placement of topsoil. The area will be lightly ripped or disked to a depth of six to 12 inches, and the topsoil applied on this prepared slope. The topsoil will then be prepared for seeding using a disc or harrowing with typical farm equipment, and the area seeded with the approved seed mix.

6.1.5 Decommissioning of the Water Treatment Plant

The WTP (**Figure 32**) will not be needed after the mine dewatering has ended, and the retention ponds are dry. Once remaining water, including that in the treatment ponds, has been treated and discharged, the bottom sediment will be sampled and analyzed to determine its composition and to identify the appropriate management and disposal methods. Sediment will be removed from the ponds using hydro-vac equipment or similar to minimize damage to the liner. Material suitable for plant growth medium will be salvaged and blended with top dressing material for use in final reclamation. Sediment deemed unsuitable for plant growth but below regulatory thresholds for contaminant concentrations, as determined through results from laboratory analysis, may be buried in mine workings, if room is available at the time. Alternatively, this material may be loaded into covered highway trucks and transported to an approved landfill. The liners will then be cut into manageable pieces, folded, and disposed of in an approved landfill or buried on site in the mine workings, depending on results from laboratory analysis.

The treatment units will be cleaned, rinsed, and disassembled for sale and reuse at another facility. If the units are not reusable, they will be cleaned, rinsed, and disassembled for disposal in an approved facility. Remaining treatment chemicals may be removed and reused at another site and storage tanks will be recycled or disposed of at an approved landfill. The empty building will be demolished using heavy equipment, with structural components cut or broken into pieces small enough for transport unless written agreement from the landowner specifies leaving the structure to support post mining grazing use. Debris will be loaded into trucks and hauled to an approved landfill. The remaining concrete slab will be broken up and placed in designated pond areas as structural fill, then covered with a minimum of 24 inches of backfill prior to topsoil and final reclamation.

At decommissioning of the WTP, when water treatment has ceased, the discharge water pipeline and mine dewatering pipelines will be removed or buried in place and the pipeline corridor reclaimed as necessary to meet the geomorphic character of the surrounding areas. Materials such as concrete structures and culverts used for arroyo crossings will be removed and the arroyos regraded to approximate pre-crossing conditions. Channel armoring materials may be left in place where necessary to provide erosion control and maintain channel stability following reclamation. The design, location, and construction of arroyo crossings and associated stormwater control features are described in Section 3.4 and the Surface Water Management Plan provided in **Appendix B**. Inspection and maintenance of culverts and drainage crossings during operations will be conducted in accordance with the Project SWPPP.

6.1.6 Disposition of Salvageable material and Demolition Debris

Salvageable materials will be segregated for recycling. Demolition debris will be staged for transportation and disposal at approved facilities.

Buildings and structures not designated for post-mine use pursuant to written agreements with landowners will be decommissioned in a systematic manner, beginning with the de-energizing of electrical systems and the shutdown of other utilities. Remaining materials, including process reagents, oils, lubricants, and batteries, will be removed and either recycled or disposed of at licensed and approved facilities in accordance with regulatory requirements. Salvageable materials such as metal and copper piping and wiring, corrugated metal siding and roofing, metal beams, windows, doors, interior cabinetry and shelving, lighting, etc. will be recovered and shipped offsite for re-use and/or recycling.

6.1.7 Regrading

After the reclamation steps discussed above have been completed, the disturbed areas of the surface facilities will be contoured and graded to meet the geomorphology and topography of the surrounding area to provide controlled drainage and to prepare those areas for revegetation.

The approximate final reclamation contours are shown in **Figure 35, Figure 36, and Figure 37**. Constructed areas that require cut-and-fill to level the surface and control stormwater run-on will require the return of fill to a cut area. Recontouring will involve the removal of constructed drainages and berms, followed by reshaping the surface to align with the natural geomorphology of the surrounding landscape. This process is designed to direct surface runoff toward permanent drainage arroyos in a stable configuration, thereby minimizing the potential for excessive erosion and supporting long-term landform stability. The areas to be recontoured will be protected during construction by erosion control BMPs such as straw bales, wattles, and silt fencing to reduce the loss of soil from stormwater. Prior to reclamation, the cut slopes in rock will be evaluated to determine their potential for long-term stability. The evaluation will include a review of observed movements from initial construction through the mining period of operation. Obvious rock debris, visible displacements of rock structure, and other physical evidence will be considered for final placement. Potentially unstable slopes will be backfilled to a final slope no greater than 3H:1V.

Recontouring will be performed by utilizing bulldozers, excavators, and road graders. Bulldozers and excavators will be used for shaping areas to meet geomorphological objectives of making the reclaimed areas consistent with pre-existing and surrounding geomorphology of the area. The graders will be used to blend the recontoured surface into adjacent undisturbed areas.

A smooth transition to adjacent undisturbed ground will be achieved by blading to meet geomorphic objectives and maintain desired slope gradient. Topsoil will be placed and ripped or disked to a depth of six to 12 inches.

Control of surface water run-on and runoff of the reclaimed areas will be accomplished as part of the recontouring and final grading, and as a part of the overall geomorphological objectives for the site. Existing natural drainage arroyos will be preserved to the extent feasible. Temporary diversion channels and stormwater control features constructed during operations will be removed, regraded, and reclaimed to approximate natural drainage patterns, unless they are determined to support long-term drainage stability and are incorporated into the final landform.

Prior to construction, stormwater runoff in the Project area flowed naturally across the surface and drained into a nearby arroyo, following the existing topography. The design of the reclaimed area contours, following geomorphologic objectives, will maintain natural drainage patterns by directing surface runoff into the same arroyos as occurred prior to operations. Drainage channel stabilization materials or structures implemented during site construction may be retained to minimize post-mining erosion. The pre-existing drainages that were diverted away from the mine operation will be recreated to the extent possible. These drainages will follow natural surface gradients such that control structures and energy dissipaters are not anticipated to be required. However, if monitoring or site conditions indicate a need for additional stabilization, appropriate control structures, energy dissipaters, or other surface stabilization measures will be implemented to check channel stability and minimize erosion.

6.1.8 Reclamation of Roads

The proposed disposition of haul roads and access roads will be reviewed by the landowners. Prior to final reclamation, the State, USFS, and landowner will determine which roads will be left intact, which will be left but returned to pre-mining condition, and which will be removed and reclaimed pursuant to written agreements with the respective landowners. If the roads retained include constructed crossings such as culverts, these structures will be removed, if requested by the landowners, and drivable low water crossings will be constructed as part of reclamation.

During road reclamation the roadbed will be ripped to a depth of 12 to 18 inches to loosen the subgrade. Road segments that were lower than the surrounding topography will be filled to match the surrounding grade, consistent with geomorphic objectives. Drainage crossings will be removed except as noted above, and the natural drainages will be graded to match the upstream and downstream inverts. After grading meets the geomorphic objective for a specific area and is consistent with the undisturbed terrain, the subgrade surface will be prepared for placement of topsoil by ripping or disking to a depth of six to 12 inches. The topsoil will then be placed on the prepared subgrade to an approximate depth of 12 inches and scarified to a depth of three to six inches, and the area reseeded with the approved permanent seed mix. Topsoil for these roads will be sourced from the closest topsoil stockpile.

Where roadway crossings, culverts, diversion channels, or other drainage features have altered existing ephemeral drainages or floodplain areas, reclamation will restore stable channel geometry, drainage continuity, and hydraulic function compatible with adjacent natural channel reaches. Restoration measures may include re-establishment of channel bed and bank configuration, removal of temporary drainage structures, reconstruction of channel tie-ins, installation of grade stabilization or erosion protection measures where warranted, and revegetation of disturbed banks and floodplain areas. Channel restoration measures will be designed to minimize the potential for erosion, head-cutting, channel incision, or loss of floodplain connectivity following reclamation.

A weed-free straw mulch will be applied to the reclaimed roadways at the approximate rate of two tons per acre. As with other locations on the reclamation site, the straw applied will be a long-stemmed straw mulch crimped into the soil with tracked equipment or tractor pulled disc.

Reclaimed road corridors and associated drainage crossings will be monitored as part of the Project's reclamation monitoring program to evaluate roadway stability, channel function, erosion, sediment transport, and revegetation success. If monitoring identifies excessive erosion, instability, failure of drainage features, or inadequate revegetation, corrective measures such as additional grading, installation or repair of erosion-control measures, drainage improvements, supplemental seeding, or other stabilization measures will be implemented until reclamation performance standards have been achieved.

Access roads to the ventilation/escape shafts that are not to be retained will be graded to match the original topography. If road surfaces were improved with crushed rock or concrete, this material would be removed prior to regrading, and the material used on another area of the roadways to be retained or hauled offsite.

Utility corridors associated with permanent mine infrastructure will generally be co-located within the common road corridors described in Section 3.2.8 to minimize additional surface disturbance. Upon completion of mining, utility corridors that are not retained pursuant to landowner agreement or regulatory authorization will be reclaimed by removing aboveground and subsurface infrastructure, as appropriate, removing unnecessary culverts and temporary drainage structures, restoring disturbed drainage features, ripping compacted surfaces, regrading to approximate original contours, redistributing salvaged topsoil where available, reseeding with the approved native seed mix, and applying mulch in accordance with this reclamation plan. The treated water transport pipeline will be 20 to 30 inch-diameter high density polyethylene (HDPE) or polyvinyl chloride (PVC) and will be buried in accordance with NM DOT specifications. Prior to reclamation, RHR will discuss preferred reclamation of this pipeline with NMDOT and BLM because the line is located within their rights of way. NMDOT and BLM may prefer to cap the line in place. If required by NMDOT and BLM, the corridor will be reclaimed by excavating the pipeline, cutting the plastic into manageable sections for disposal in a landfill, refilling the trench, grading to match the original topography, applying the specified seed mix, then mulching and crimping. The concrete encasements, concrete manholes, drainage crossing support structures, and the arroyo discharge structure will be removed, crushed, and hauled to a licensed or approved disposal site.

Diversion structures constructed during operations are distinct from existing natural drainage channels. Temporary diversion channels, berms, and associated stormwater control features that are no longer required following mining will be removed during reclamation unless demonstrated to provide long-term drainage stability and approved as part of the final reclamation configuration. Existing natural drainage channels disturbed by Project activities will be restored to stable geomorphic and hydraulic conditions compatible with adjacent undisturbed reaches. Final restoration of drainage features will be based on the final Surface Water Management Plan developed during detailed engineering and the approved reclamation plan.

6.1.9 Placement of Topsoil, Seeding and Mulching

Topsoil will be placed as the final layer of material over the areas to be reclaimed. Because topsoil stockpiles are typically constructed to maintain stability and prevent erosion, materials stored at depths greater than two feet have been largely deprived of oxygen and moisture. This lack of exposure can reduce biological activity essential for supporting plant growth. To address this, the deeper topsoil may be amended with Mycorrhizal Inoculum prior to placement at the time of

seeding at a rate of 3.6 million propagules per acre (as specified by the supplier) to facilitate root establishment and growth.

To further amend the stockpiled topsoil, organic fertilizer will be applied at a rate of 75 pounds of nitrogen per acre. Current organic fertilizer utilized for this type of amendment include Biosol 6-1-3, Fertil-Fibers 6-4-1 and Sustane 5-2-4.

Topsoil will be applied to areas disturbed by mining activities that are subject to reclamation and revegetation. Mycorrhizal inoculum and organic fertilizer amendments will be applied to salvaged topsoil used in these areas, including material originating from deeper portions of stockpiles. Areas that are not subject to reclamation, or that will remain as part of the approved post-mining land use will not receive topsoil or associated amendments.

Salvaged topsoil will be applied to all temporary and permanent surface disturbances that are reclaimed and revegetated as part of the approved reclamation plan. These areas generally include temporary drill pads, development drilling pads, geotechnical drilling pads, dewatering well pads, ventilation shaft pads, temporary mud pits and sumps following closure, temporary access roads not retained following mining, reclaimed stockpile areas, reclaimed utility corridors, reclaimed surface facility areas, and other disturbed areas where the approved post-mining land use requires revegetation. Mycorrhizal inoculum and organic fertilizer amendments will be applied to salvaged topsoil placed in these reclaimed areas, including material originating from deeper portions of topsoil stockpiles.

Topsoil and associated amendments will not be applied to facilities or areas that remain in approved post-mining use or are retained following reclamation pursuant to landowner agreement or regulatory authorization, including retained roads, utility corridors, or other permanent features where revegetation is not required. Such areas will only receive topsoil and associated amendments if reclamation of those features is subsequently required under the approved reclamation plan.

After topsoil is placed, it will be lightly ripped or disked to a depth of three to six inches to prepare a loose and optimum seedbed. Achieving good seed-to-soil contact and ensuring that seeds are adequately covered with soil are critical factors for successful plant establishment in reclaimed areas.

Revegetation of the disturbed area will be designed to create a stable, self-sustaining plant community and will conform with the post-mining land use of grazing. Greater detail on revegetation is presented in Section 7.7. The disturbed Project area will be reseeded; using methods best suited to an area's topography. Most topography will be gentle slopes conducive to broadcast or drill seeding. In select areas where slopes are too steep to permit use of drill seeding equipment, the area may be hand broadcast or hydroseeded.

The plant species included in the proposed reclamation seed mix have a proven record of success in this region of New Mexico. The seed mix has been previously approved by the New Mexico Mining Division for use at the nearby Lee Ranch Coal Mine, many other smaller exploration areas, and some former uranium mines in the Project vicinity. The plant species, and varieties in the seed mix, are adapted to the soils, climate, and geomorphic character of the McKinley/Cibola County region. Local experience has demonstrated that these plant species can reestablish stable, self-sustaining plant communities that support livestock grazing without the need for soil amendments or intensive care. Successful revegetation has been achieved with the proposed seed mix through proper topsoil management and placement, followed by seeding and the application of weed-free straw mulch.

Mulch will be applied at a rate of 2 tons per acre, and will consist of a long-stemmed, weed-free straw. The straw will typically be applied from 1 ton round bales and distributed with a mulch blower that unrolls the bales and spreads the straw. This results in longer stemmed straw segments which can then be effectively crimped into the soil to anchor it and provide its beneficial properties to the re-establishment of vegetation on the area. This practice has also been shown to be effective at the nearby Lee Ranch Coal operations.

On slopes that may be too steep to apply mulch with this method, straw may be hand spread or spread with a smaller straw blower and anchored using a tackifying agent. Lastly, the areas may be hydro-seeded and hydro-mulched if no other technique is feasible. Additional erosion control BMPs will be placed around the reclaimed areas, in close proximity and remain until vegetation has been established. Monitoring of the areas will be conducted on a periodic basis as required by the Permit to Mine by a qualified botanist, vegetation specialist, or similarly educated professional. The progress of the reclaimed areas will be compared to the reference plot.

6.1.10 Reference Area

A fenced, controlled plot of ground, planted with the revegetation seed mix for a similar location in the permit area, will be established prior to or during early Project development and maintained throughout operations to serve as a reference area for evaluating reclamation success. The reference area is located in Section 16 and is described in detail in **Appendix H**. As documented in **Appendix H**, the reference area consists of a 137-acre area containing eight (8) permanent transects situated in portions of the site that are not anticipated to be disturbed by mining activities. These transects were selected from a broader dataset collected across the Project area and are representative of the dominant vegetation types targeted for reclamation (primarily shrub-grassland and juniper savanna). Statistical evaluation of baseline data demonstrates that vegetation and ground cover characteristics within the reference area are representative of areas to be disturbed, supporting its use as a benchmark for reclamation performance. The reference area was selected from the broader baseline vegetation dataset collected throughout Sections 9, 10, 11, 12, and 16 during the 2008 and 2010 field investigations. As documented in the BDR (Vegetation Survey Report) and Appendix H, eighty-one (81) transects were established across the Project area to characterize vegetation communities prior to development. Statistical analyses were then performed to identify undisturbed areas having vegetation composition, ground cover, productivity, and diversity representative of the dominant plant communities anticipated to be disturbed by mining. The selected reference area in Section 16 represents the dominant reclamation target communities (primarily shrub-grassland and juniper savanna), which comprise the majority of areas requiring reclamation. The reference area was selected based on ecological similarity and statistical representativeness rather than land ownership or jurisdiction.

The proposed revegetation reference area was selected because it is representative of the ecological conditions and plant communities anticipated to be reclaimed within the Project disturbance areas. While vegetation communities vary across the permit area, the reference area provides an appropriate basis for evaluating revegetation success because it reflects the dominant plant communities, site capability, soils, elevation, and ecological conditions expected following reclamation. Revegetation success criteria will be applied in a manner that is consistent with the approved post-mining land use and the objective of restoring self-sustaining native plant communities compatible with surrounding National Forest System lands.

Although mature piñon-juniper woodland occurs within portions of the Project area, the proposed reference area was selected to represent the dominant vegetation communities anticipated to be reclaimed rather than every vegetation association present within the permit area. Accordingly,

the proposed reference area emphasizes shrub-grassland and juniper savanna communities because these comprise the majority of the anticipated reclamation acreage. Native grasses, forbs, shrubs, and appropriate woody species will be incorporated into the reclamation seed mix, consistent with the approved post-mining land use, site capability, and applicable reclamation performance standards. Revegetation success will be evaluated using the monitoring methods described in Section 7.7.

Vegetation and ground cover within both the reference area and reclaimed areas will be evaluated using consistent, repeatable methods (e.g., point-intercept transects). Monitoring will focus on parameters including, but not limited to:

- Total vegetation canopy cover (grasses, forbs, shrubs, and microbotic crust);
- Ground cover composition (bare ground, rock, and gravel); and
- Litter cover.

Reclaimed areas will be seeded with an approved weed-free native seed mix, as described in Section 7.7. and will be monitored over time with results quantitatively compared to the reference plot to evaluate revegetation success. Performance standards will be based on achieving vegetation cover, composition, and ground cover characteristics comparable to the reference conditions, within acceptable statistical ranges.

The reference area will be maintained in an undisturbed condition and protected (e.g., through fencing, as appropriate) to verify its continued suitability for comparison over the life of the Project. Monitoring, maintenance, success criteria, and adaptive management measures—including corrective actions if performance standards are not met—are described in Section 7.7 and will be implemented until reclamation success is achieved in accordance with applicable regulatory requirements.

6.1.11 Remove Reclamation Areas Fencing

During operations, areas will be fenced to control access. The fences will remain during reclamation until the recontouring and grading begins. The 8-foot fences surrounding the mine operations areas will be removed and sent off site for disposal or recycling, to allow access and ease of movement for the heavy equipment for regrading and reclamation operations. After the areas have been seeded, they will be fenced with livestock fencing, constructed in accordance with specifications for minimizing injury to big game animals as described in the New Mexico Department of Game and Fish Habitat Guidelines for Mine Operations and Reclamation (NMDGF, 2004), until vegetation is established. If the landowners desire, the fencing will be removed after reclamation approval.

6.2 Reclamation Maps and Schedule - 19.10.6.602.D.(15)(h)

(h) A map or maps at a scale approved by the Director and an approximate schedule indicating the reclamation activities to take place on disturbed areas of the mine site including the number of acres to be reclaimed. A permittee will be required to follow the sequence described unless modified or revised.

Figure 4, Figure 5, Figure 6, Figure 7, and Figure 8 indicate the surface facilities to be constructed for the proposed mine operation. These facilities will be removed and the surface reclaimed during the timelines presented in Section 6.2. It is estimated that approximately 305

acres required for surface facilities, including access roads, haul roads, utility corridors and pipeline corridors, will require reclamation.

The schedule for the reclamation activities is presented in **Table 19** and **Table 20**. The schedule is relative to when activities start and end, as the exact year and month that reclamation will be initiated cannot be accurately predicted at this time. In addition, Table 21 presents the estimated bond release schedule. Overall reclamation operations are currently planned to extend for approximately six years.

Forest Road Reclamation (FR 192 and Unnamed Forest Road – Section 11)

In addition to the reclamation of mine facilities and associated disturbances described above, Roca Honda Resources (RHR) will restore National Forest System (NFS) roads utilized as part of the primary haul route in Section 11, including Forest Road (FR) 192 and the unnamed Forest Road, to conditions consistent with their pre-Project state and U.S. Forest Service requirements.

Reclamation of Forest Roads will be conducted in coordination with the U.S. Forest Service and will be designed to return the roads to their original function, profile, and drainage characteristics. Specific reclamation measures will include:

- **Surface Restoration:** Removal of any Project-related surfacing materials (if different from existing conditions) and reestablishment of the original road surface condition (e.g., native or aggregate surface consistent with pre-Project conditions).
- **Regrading and Contouring:** Regrading of road surfaces, shoulders, and adjacent disturbed areas to match original road prism geometry, including width, slope, and drainage features.
- **Drainage Restoration:** Reconstruction or repair of existing drainage features (e.g., water bars, rolling dips, culverts, ditches) to verify proper function and to prevent erosion or sediment transport.
- **Compaction Relief:** Scarification or ripping of areas compacted beyond typical road use, where necessary, to restore infiltration and support vegetation establishment along road margins.
- **Revegetation:** Disturbed areas outside of the maintained road prism (e.g., pullouts, widened areas or temporary disturbance areas) will be revegetated using an approved, site-appropriate, certified weed-free seed mix in coordination with the U.S. Forest Service.
- **Removal of Temporary Features:** Any temporary improvements (e.g., laydown areas, turnouts, signage, or traffic control features) installed for Project use will be removed.

Where roads are intended to remain as part of the Forest transportation system, reclamation will focus on restoring the road to its pre-Project condition and functionality rather than full closure. If any road segments or spurs are no longer needed post-mining, closure measures (e.g., recontouring, installation of water bars, and full revegetation) will be implemented in coordination with the U.S. Forest Service.

These measures will make sure that Forest Roads used during operations are returned to conditions consistent with U.S. Forest Service standards, maintaining long-term usability, drainage function, and landscape integration.

Table 20. Reclamation Schedule: Sections 9, 10, 11, 15, 16, and discharge pipeline to RSJ

Reclamation Activity	Estimated Timing	Closure Phase	Performance Standard / Closure Criteria
Vent Shafts	2044 Q2 – 2045 Q2	Early Closure	Radon flux ≤ 20 pCi/m ² /s; engineered plug installed; no subsidence, cracking, or preferential pathways; verified using EPA-approved radon flux measurement methods
Drillholes	2044 Q2 – 2045 Q1	Early Closure	Fully cemented to surface; prevents vertical fluid migration; abandonment meets regulatory standards; stable with no collapse
GW Compliance Wells (active management)	2044 Q2 – 2046 Q2	Active Closure	Groundwater stabilized (≤ 0.5 ft/month change); water quality meets NMED standards or approved background
Dewatering Wells (active management)	2044 Q2 – 2046 Q2	Active Closure	Continuous grout column from bottom to surface; not annular space; no evidence of vertical migration between aquifers or surface seepage at well location
Dewatering Pads	2045 Q3 – 2046 Q2	Mid Closure	Pads removed and regraded; soils meet cleanup standards via confirmation sampling; no ponding or infiltration pathways
Ore Bay	2044 Q3 – 2045 Q2	Early Closure	All ore and mineralized materials removed; confirmation soil sampling demonstrates compliance with cleanup criteria
Stockpiles	2044 Q3 – 2045 Q3	Early Closure	Materials removed or stabilized; no exposed radiological contamination; erosion controlled
Buildings	2045 Q1 – 2045 Q4	Mid Closure	All structures removed to ≥ 3 ft below ground surface; foundations ripped and backfilled; confirmation sampling meets standards
Production Shaft	2045 Q1 – 2046 Q2	Mid Closure	Engineered closure system prevents vertical migration of water and gas; certified by licensed engineer
Pipelines	2045 Q1 – 2046 Q1	Mid Closure	Removed or grouted and buried in place; no preferential pathways; discharge pipeline to be buried in place in ROW*
Shaft Pads	2045 Q3 – 2046 Q2	Mid Closure	Regraded to natural contours; compacted and stable; integrated with surrounding terrain
Graded Pads	2045 Q4 – 2046 Q3	Regrading Phase	Final landform achieved; slopes $\leq 3H:1V$; positive drainage established; no ponding
Development Drilling Pads	2045 Q4 – 2046 Q3	Regrading Phase	Topsoil redistributed; erosion controlled; ready for revegetation
Haul Roads	2046 Q1 – 2046 Q4	Regrading Phase	Roads ripped and recontoured; natural drainage restored; no active erosion (no gully, rills < 3 inches)
Access Roads	2046 Q1 – 2046 Q4	Regrading Phase	Same as haul roads; reclaimed unless designated for post-mining use
Retention Ponds	2046 Q2 – 2046 Q4	Final Stabilization	Stable or removed; designed to withstand 100-year, 24-hour storm; no structural failure or seepage
Fencing	2046 Q3 – 2047 Q1	Final Closure	Removed unless required; site accessible to wildlife; no hazards remain

Table 21. Reclamation Schedule: Section 17

ROCA HONDA MINE: Plan of Operations and Mine Operations and Reclamation Plan (PoO-MORP)

Reclamation Activity	Estimated Timing	Closure Phase	Performance Standard / Closure Criteria
Vent Shafts	2046 Q2 – 2047 Q1	Early Closure	Radon flux ≤ 20 pCi/m ² /s; engineered seal verified; no preferential pathways
Drillholes	2046 Q2 – 2047 Q1	Early Closure	Cemented and abandoned per regulatory standards; no leakage
GW Compliance Wells (active management)	2046 Q2 – 2048 Q1	Active Closure	Groundwater stabilized (≤ 0.5 ft/month change); water quality meets NMED standards or approved background
Dewatering Wells (active management)	2046 Q2 – 2048 Q1	Active Closure	Continuous grout column from bottom to surface; not annular space; no evidence of vertical migration between aquifers or surface seepage at well location
Dewatering Pad	2047 Q2 – 2048 Q1	Mid Closure	Removed and regraded; soils meet cleanup criteria
Ore Bay	2046 Q3 – 2047 Q2	Early Closure	All materials removed; no residual contamination above standards
Stockpiles	2046 Q3 – 2047 Q3	Early Closure	Stabilized or removed; erosion controlled; sampling compliant
Buildings	2047 Q1 – 2047 Q4	Mid Closure	Demolished and removed below grade; contamination addressed
Production Shafts	2047 Q1 – 2048 Q1	Mid Closure	Engineered closure; prevents water/gas migration; certified
Pipelines*	2047 Q1 – 2048 Q1	Mid Closure	Removed or grouted and buried in place; no preferential pathways;
Shaft Pads	2047 Q2 – 2048 Q2	Regrading Phase	Recontoured; stable slopes; integrated with surrounding terrain
Graded Pads	2047 Q2 – 2048 Q2	Regrading Phase	Final grading complete; erosion minimized
Parking Areas	2047 Q2 – 2048 Q2	Regrading Phase	Compacted surfaces ripped; revegetated
Haul Road	2047 Q2 – 2048 Q3	Regrading Phase	Drainage restored; no gullying
Access Roads (not reused)	2047 Q2 – 2048 Q3	Regrading Phase	Fully reclaimed; indistinguishable from surrounding terrain
Diversion Channels	2048 Q1 – 2048 Q3	Final Stabilization	Stable under 100-year storm; no erosion or failure
Retention Ponds	2048 Q1 – 2048 Q3	Final Stabilization	Function stable or reclaimed; no seepage issues
Fencing	2048 Q2 – 2048 Q3	Final Closure	Removed unless required; wildlife passage restored
Water Treatment Plant & Infrastructure, including discharge pipeline to RSJ*	2048 Q2 – 2048 Q4	Final Closure	Groundwater meets NMED standards; no further treatment required; facility removed; regulatory approval obtained

* Final activity—remains operational until groundwater and discharge compliance achieved and assumes decommissioning only if ownership is not transferred.

Table 22. Estimated Bond Release Schedule and Criteria

Bond Release Phase	Applicable Activities	Performance Standards / Closure Criteria	Verification Method	Estimated Timing	Estimated Bond Release (%)
Phase I – Initial Reclamation Completion	Vent Shafts, Drillholes, Ore Bay, Stockpiles, Buildings,	Radon flux ≤ 20 pCi/m ² /s; drillholes cemented; structures	Radon testing reports; engineer certification; demolition	2045 Q2 – 2047 Q1	40–50%

Bond Release Phase	Applicable Activities	Performance Standards / Closure Criteria	Verification Method	Estimated Timing	Estimated Bond Release (%)
	Pipelines*, Production Shaft	removed ≥ 3 ft below grade; source materials removed; no contamination above cleanup criteria	records; soil sampling		
Phase II – Regrading and Site Stabilization	Shaft Pads, Graded Pads, Roads, Parking Areas	Final landform achieved ($\leq 3H:1V$ slopes); positive drainage; no active erosion; topsoil redistributed	Topographic surveys; inspections; photo documentation; erosion monitoring	2046 Q1 – 2048 Q2	30–40%
Phase III – Final Closure and Performance Demonstration	Retention Ponds, Diversion Channels, Revegetation, Dewatering Closure, Water Treatment Plant*	Groundwater stabilized; meets NMED standards; revegetation ≥ 70 –90% reference cover for 2 years; stormwater stable; WTP removed after approval*	Groundwater monitoring; vegetation reports; inspections; regulatory approval	2047 Q2 – 2049 Q4	10–30%

* Final activity—remains operational until groundwater and discharge compliance achieved and assumes decommissioning only if ownership is not transferred.

Bond release dates shown in Table 21 are planning estimates only. No financial assurance will be released solely on the basis of the passage of time. Release of financial assurance will be based upon completion of the applicable reclamation activities and demonstration that the applicable performance standards and closure criteria have been achieved, subject to MMD approval and applicable regulatory requirements.

6.3 Reclamation Topographic Map(s) - 19.10.6.602.D.(15)(i)

- (i) *A topographic map of the anticipated surface configuration of the permit area upon the completion of reclamation operations.*

Topographic maps of the anticipated surface configuration of the Project area upon the completion of reclamation operations are provided in **Figure 35**, **Figure 36**, and **Figure 37**. The objective of the final site contours of the Project area is for the reclaimed areas to be stable from mass-movement and erosional conditions and to be compatible with the geomorphic character of the general area. In support of the post-mining land use objective of livestock grazing, flatter slopes are preferred in the reclaimed landscape. Flatter terrain allows precipitation to infiltrate more effectively into the surface soil profile, making moisture more readily available to plant root systems. This promotes the development of more robust, stable, and productive vegetation communities. In contrast, steeper slopes tend to shed water more quickly, are more prone to erosion, and typically support less biomass due to reduced moisture retention and more challenging growing conditions. Designing reclaimed slopes with gentle gradients not only enhances vegetation success but also contributes to long-term landform stability and sustainable land use.

6.4 Toxic Drainage After Reclamation - 19.10.6.602.D.(15)(j)

- (j) *A description of the potential for the generation of acid or other toxic drainage from overburden and waste materials following reclamation and a design that incorporates measures to reduce, to the extent practicable, the formation of acid or other toxic drainage that may otherwise occur following reclamation to prevent releases that cause federal or state standards to be exceeded.*

6.4.1 Waste Characterization

As discussed in Section 7.4 of the BDR (RHR, 2020), historically, acid mine drainage has not been a problem in the Grants Mineral Belt. While some sulfides are known to exist in some rock formations beneath the planned mining area, acid neutralization potential exceeds acid generation potential.

There is little or no potential for geochemical alteration of overburden, the ore body, or other material. The material excavated during shaft construction and operations will primarily be overburden from rocks overlying the Westwater Canyon Member and material from the Westwater Canyon Member i.e., the ore zone. The only materials overlying the Westwater Canyon Member in the Project area that have potential to contribute to acid drainage are the thin coal beds in the Dilco Coal and the Gibson Coal Members of the Crevasse Canyon Formation.

The Dilco Coal Member is present only deep below ground surface in the Project area. Section 7.3.1 of the BDR (RHR, 2020) indicates that the Dilco is approximately 600 feet below the surface in Section 16 and 900 feet below the surface in Section 10. The Dilco has an average thickness of 120 feet and a maximum thickness of 128 feet in the Project area. The Gibson Coal Member crops out at the surface side slopes of the mesas in Sections 9 and 10 of the Project area. At the location of the shafts, the Gibson is typically 100 to 300 feet below the surface. The Gibson has a maximum thickness of 240 feet in the Project area.

The individual thickness of the coal seams in the Dilco and the Gibson Members is in the order of five feet thick or less. The Gibson has a reported sulfur content of 0.6 percent sulfur due to trace amounts of pyrite (Kirschbaum and Biewick, 2000). While this could theoretically lead to the production of acid drainage, laboratory studies show that shale/coal with sulfur content less than one percent rarely produces significant acid drainage (Morrison, 1985).

Moreover, RHR's activities in the Dilco and Gibson are limited to transecting the formations during construction of the production and ventilation shafts. As such, the potential for acid and other toxic drainage is inconsequential.

The shaft in Section 17 is currently finished in the top of the Westwater Canyon Member of the Morrison Formation (the ore bearing horizon), but outside of ore, approximately 200 ft above its planned total depth. It is currently flooded to about 750 ft bgs. No development into the ore body from the shaft was ever completed.

In the Westwater Canyon Member, clay minerals are the primary iron-bearing phase (Riese, 1980). The Westwater Sandstone contains areas where the dominant iron mineral is hematite, and areas where the dominant iron mineral is limonite (Saucier, 1980). However, since both limonite and hematite chemically alter pyrite (a potential acid-producing constituent), the new compound formed from pyrite no longer has the potential to generate acid solutions.

6.4.2 Material Handling Plan

As previously noted, RHR has committed to characterization of excavated shaft and non-ore development rock materials as a condition of the NMED approved Discharge Plan. These materials will be analyzed to determine the potential for acid generation or other constituents of concern. Material excavated during construction of the mine shafts and vent holes will be temporarily stored in designed lined and unlined stockpiles, as determined by its composition, to prevent mass movement and protect it from stormwater run-on. If the material is chemically inert, it will be returned to the mine and used to backfill areas for stability during mining. If the analytical results indicate the presence of potential acid generating or toxic constituents, the material will be managed in accordance with regulatory requirements.

Runoff from these stockpiles will be collected in lined stormwater retention ponds. Water that does not evaporate will be pumped to the WTP and treated before it is discharged. The sediment from the ponds will be analyzed and managed in accordance with regulatory requirements.

6.4.3 Post-Closure Groundwater

Prior to final closure, RHR will evaluate groundwater conditions associated with cessation of mine dewatering and recovery of hydraulic heads within affected formations.

The evaluation will consider:

- groundwater-level recovery;
- groundwater flow-direction changes;
- potential changes in groundwater chemistry;
- interaction between flooded mine workings and surrounding formations;
- potential migration of constituents from underground workings;
- expected recovery duration; and
- the need for continued monitoring or corrective action.

The evaluation will be based on the current groundwater model, available hydrogeochemical information, monitoring data collected during operations, and applicable regulatory requirements.

Post-closure monitoring will continue for the period necessary to demonstrate compliance with applicable performance standards and approved regulatory requirements.

6.5 Contemporaneous Reclamation - 19.10.6.602.D.(15)(k)

(k) A detailed description of how waste, waste management units, pits, heaps, pads and other storage piles will be designed, sited and constructed in a manner that facilitates, to the maximum extent practicable, contemporaneous reclamation and are consistent with the approved reclamation plan.

Where possible, contemporaneous reclamation will be implemented throughout the life of the Project (see **Table 12**). As facilities, drill sites, and infrastructure become inactive or are no longer required for ongoing operations, they will be reclaimed in accordance with approved design criteria. This includes:

- Immediate reclamation of exploration drillholes and temporary pads following use;
- Temporary drilling-related disturbances associated with dewatering well construction, including mud pits, cuttings pits, temporary sumps, and staging areas, will be reclaimed immediately following completion of well construction and transition to the permanent operational well pad configuration.
- Progressive removal of unused equipment, materials, and stockpiles;
- Incremental regrading and stabilization of inactive areas; and
- Early initiation of revegetation where final grading has been achieved.

The underground nature of the Roca Honda Mine precludes much opportunity for contemporaneous reclamation activities other than concurrent backfilling of mined out stopes or other mine workings. Areas disturbed will be minimized to the extent possible, and an area that is disturbed during construction and operations will remain disturbed and utilized for the life of the Project. The exceptions are development drill sites that will be reclaimed immediately after geophysical logging and vent shaft pads that will be partially reclaimed following construction.

Section 3.2 outlines the procedures for material handling to support contemporaneous reclamation wherever feasible. Early reclamation activities will include salvaging topsoil and placing it in protected stockpiles for future use, promptly closing dewatering wells once they are no longer required, and reclaiming drill sites as soon as drilling operations are completed. During shaft construction, excavated rock generated from the sinking of the production and ventilation shafts will be brought to the surface and may be temporarily stored in designated stockpile areas until it can be used or properly managed. The design, siting, and construction of these temporary stockpiles are discussed in Section 3.2.2. The material will be either transported offsite for disposal or returned to the mine as engineered fill. As part of contemporaneous reclamation, as soon as the material to be removed offsite is transported from a temporary stockpile, that stockpile area will be reclaimed as discussed in Section 6.1.

The non-ore development rock produced from initial mine development will be brought to the surface and stockpiled separately. It may be used in backfilling mine workings or hauled to the mill if sufficient uranium to justify processing is present. As the mine develops and ore begins to be removed from the mine, non-ore development rock will remain underground to be used as backfill. This comprises contemporaneous reclamation as it avoids leaving waste rock piles on the surface that would otherwise require reclaiming at the end of the mine life.

Temporary drill pads, temporary access routes, cuttings management areas, staging areas, and other temporary construction features will be reclaimed immediately following completion of drilling unless retained for future operational use. Reclamation activities include removal of temporary equipment and materials, removal of liners where applicable, plugging and abandonment of drill holes as appropriate, regrading, replacement of topsoil, revegetation, and post-reclamation inspections to verify successful reclamation in accordance with applicable permit requirements.

Table 12. Contemporaneous Reclamation Schedule

ROCA HONDA MINE: Plan of Operations and Mine Operations and Reclamation Plan (PoO-MORP)

Facility / Disturbance Type	Trigger for Reclamation	Reclamation Timing	Reclamation Activities	Performance Standard / Interim Criteria
Exploration Drillholes	Completion of drilling program	Within 90–120 days	Plug and abandon drillholes; remove casing; regrade pad	Proper abandonment; no vertical migration; surface stable
Development Drill Pads	No longer needed	Within 6 months	Remove equipment; regrade; topsoil replacement; remove temporary liners, drilling fluids, and cuttings; regrade and reclaim drill pad; complete post-reclamation gamma radiation survey.	Slopes $\leq 3H:1V$; erosion controlled
Temporary Access Roads	No longer required	Within 1 year	Rip compacted surface; recontour; restore drainage	No ponding; no gullying; natural drainage restored
Dewatering Wells (non-compliance)	No longer needed	Deferred to Final Reclamation	Maintain in standby condition; secure wellhead; periodic inspection	Well integrity maintained; no contamination; available for emergency use
Non-Ore Development Rock (Initial Mine Development)	Rock generated during early underground development	Concurrent with mining (ongoing)	Transport to surface; stockpile separately in designated area	Stockpiles stable; no erosion; segregated from ore; no contamination
Non-Ore Development Rock (Ongoing Operations)	Transition to ore production phase	Concurrent with mining (ongoing)	Remains underground; used as backfill	Underground placement stable; no need for surface reclamation
Haul Roads	Abandoned	Within 1 year	Rip and recontour; install drainage	No erosion; slopes stable
Stormwater Controls	No longer needed	As replaced	Remove or reconfigure; stabilize	No unstable features
Inactive Facility Areas	Out of service	Within 6–12 months	Remove infrastructure; regrade; seed	Meets grading and revegetation criteria

7.0 Performance and Reclamation Standards and Requirements - 19.10.6.603

The permit area will be reclaimed to achieve a self-sustaining ecosystem appropriate for the life zone of the surrounding areas following closure unless conflicting with the approved post-mining land use. Each reclamation plan must be developed to meet the site-specific characteristics of the mining operation and the site.

The Project area will be reclaimed to support the post-mining land use of livestock grazing following closure. The proposed Reclamation Plan has been specifically tailored to reflect the unique characteristics of both the site and the mining operation. This approach allows reclamation activities to effectively restore the land to a condition suitable for grazing, aligning with long-term land use goals and regulatory requirements.

7.1 Most Appropriate Technology and Best Management Practices - 19.10.6.603A

The mining operation and the reclamation plan shall be designed and operated using the most appropriate technology and the best management practices.

“Most appropriate technology” (MAT) means the most suitable technology for a given application, in this case, reclamation activities. In practice, it means selecting and using the appropriate level of technology that can effectively achieve the intended purpose while disturbing the environment as little as possible. BMPs are effective, practical, structural or nonstructural methods that prevent or reduce the impact of a particular activity on the environment. They include currently accepted, tested methods and materials.

The reclamation methods described in the following sections include the most appropriate technologies and best management practices. These methods are developed to achieve a balance between performance of the reclamation activities and protection of the immediate and surrounding environment as an integral component of the proposed Reclamation Plan.

7.1.1 Stormwater Quality

Potential effects to stormwater quality during construction, operations and reclamation come primarily from the earth moving activities associated with excavation, transportation, and distribution of materials from roads, sub-base rock and topsoil. Should precipitation occur during this time, the potential for downgradient effects from the transport of sediment, and to a lesser extent, fuels and lubricants from equipment are the greatest. To minimize the potential effects from precipitation during reclamation operations, sediment control BMPs will be established downgradient of reclamation areas to localize effects of rain during operations. A list of potential pollutants that could affect stormwater quality is listed in **Table 22** and **Table 23**.

7.1.2 Stormwater Management Controls

The proposed temporary reclamation BMPs are designed to stabilize soils in active work areas and implement structural controls that manage surface water. These measures will divert run-on and runoff, reduce erosion, capture sediment, and mitigate potential stormwater pollutants from sources such as vehicle tracking and wind erosion. To maximize effectiveness, reclamation activities will be coordinated with the implementation of BMPs, ensuring timely and integrated stormwater protection throughout the Project area.

The following temporary and permanent BMPs may be implemented, as appropriate, during reclamation activities (see typical designs in **Figure 38**):

Existing vegetation. Disturbance of existing vegetation with equipment or vehicles will be minimized to the maximum extent possible in the work areas to reduce or eliminate erosion in those areas.

Straw bales. Two or three string bales of weed free straw, measuring approximately three to four feet long and 18 inches square are effective materials for the control of overland water flow, and act to filter, reduce velocity and divert surface flow. Straw bales have more weight and mass than wattles and can often be left in place to naturally degrade over time and add organic matter to the area. Straw bales are secured with two wooden stakes driven through the bales about ten inches from each end.

Wattles. Wattles are tubes of rice, straw, fiber, or composted material used for erosion control, sediment control, and stormwater runoff control. They help to stabilize slopes by slowing, spreading, and filtering overland water flow, which in turn helps to prevent sheet erosion and rill and gully development. As necessary, wattles will be placed along the perimeter downgradient of the areas to be graded or recontoured before reclamation takes place during periods when precipitation is likely. They may also be placed along washes and arroyos, down-slope of exposed soil areas. Once in place, they will be staked at approximately three-foot intervals to anchor them in place.

Wind erosion control. Wind erosion control consists of applying water and/or other dust palliatives as necessary to prevent or reduce erosion by the forces of wind. Water spray may be applied to small, temporary soil piles during reclamation activities. This measure is part of a broader, Project-wide dust abatement program that will be implemented during construction, operations, and reclamation using best management practices (e.g., water application, dust palliatives, and traffic controls). Water use for dust suppression will be applied on an as-needed basis depending on site conditions and is not expected to require a fixed or continuous volume.

Table 23. Potential Pollutant Sources - Equipment²

Material	Chemical/Physical Description	Use	Potential Pollutant ¹
Antifreeze	Colorless or colored oily liquid	Antifreeze coolant for equipment	Ethylene glycol
Cleaning solvents	Colorless, blue, or yellow-green liquid	Cleaning equipment	Perchloroethylene, methylene chloride, trichloroethylene, petroleum distillate

Diesel fuel	Clear, blue-green, or yellow liquid	Fuel for generators, trucks, heavy equipment	Petroleum distillates, oil and grease, naphthalene, xylene
Gasoline	Colorless, pale brown or pink liquid	Fuel for trucks	Petroleum hydrocarbon, benzene, ethyl benzene, toluene, xylene, methyl tertiary-butyl ether
Grease, petroleum based	Reddish color, semi-solid gel	Lubricant	Petroleum hydrocarbon
Hydraulic fluid	Brown oily petroleum hydrocarbon	Hydraulic devices	Mineral oil
Oil	Brown or dark brown oily liquid	Lubricant	Petroleum hydrocarbon

1. Data from Safety Data Sheets, if available

2. These fluids will generally only be used in designated, enclosed shop/equipment maintenance areas equipped with sumps to contain possible fluid spills. Most mining equipment will be fueled and maintained in designated underground service areas.

Table 24. Potential Pollutant Sources – Non-Equipment Related

Drainage Area	Potential Contributors	Source of Potential Pollutants
Cleared and graded areas	Soil and sediments	Erosion from cleared and graded areas
Demolition and reclamation sites	Soil; sediments; hydraulic fluid, oil, gasoline, and diesel from heavy equipment	Erosion from cleared and graded areas Leaking equipment and support vehicles Spills during fueling and maintenance of equipment and vehicles
Site entrance(s) and exit(s), and access roads	Soil, sediments, gasoline, diesel, oil, and hydraulic fluid	Leaking equipment and vehicles Spills during fueling and maintenance of equipment and vehicles Tracking of soil to and from work areas

7.1.3 Practices to Minimize Effects to Stormwater

Specific management practices can be applied to reclamation activities to help minimize potential effects to stormwater in the Project area. These practices will include the implementation of good housekeeping and spill control practices, as discussed below.

Trash and debris. Trash and debris from the site will be collected and deposited in securely lidded metal dumpsters, which will be emptied as needed by offsite licensed contractors.

No trash or debris will be buried onsite. Personnel will be instructed regarding the correct procedure for waste disposal during reclamation activities.

Sanitary waste. The sanitary wastewater treatment units will remain until late in the reclamation process. Portable units will be placed around the final areas after the treatment system has been dismantled.

Project site access. The entrance and exit points to the Project area will be stabilized to reduce the amount of mud and dirt tracked onto public roads by vehicles and heavy equipment. Stabilization will be accomplished by:

- Limiting the points of entrance/exit to the Project site;
- Limiting the speed of vehicles to control dust;
- Properly grading each entrance/exit point to direct runoff away from the entrance/exit; and

- Placement of larger diameter rock (4 to 8 inches) in a 12-inch layer for 50 feet from the pavement to dislodge soil from vehicle tires leaving the Project area.

Vehicle and equipment fueling. Vehicles that are taken offsite at the end of a work shift will be refueled offsite whenever possible (i.e., in town). Equipment and vehicles refueled onsite will follow the practices outlined below:

- Mobile fueling of equipment throughout the site will be minimized. Whenever practical, equipment will be transported to the designated fueling area(s);
- Absorbent spill clean-up materials and spill kits will be available in the fueling area and on fueling trucks used to refuel equipment outside the designated fueling area, and will be disposed of properly after use;
- Drip pans or absorbent pads will be used as necessary during vehicle and equipment fueling;
- Fueling will be performed on level-grade areas;
- Nozzles used in vehicle and equipment fueling will be equipped with an automatic shut-off to control drips. Fueling operations will not be left unattended;
- Fuel tanks will not be "topped off." Attendant will be present during fueling operations; and
- If fueling is required away from the central fueling area, the fueling area will be located at least 100 feet from downstream drainages and waterways.

Vehicle and equipment maintenance. Vehicle and equipment maintenance procedures and practices will be designed to minimize or eliminate the discharge of fuel spills and leaks to site waterways.

- Site vehicles will be monitored daily for leaks and will receive regular preventive maintenance to reduce the potential for leaks. Vehicles with leaks will be repaired immediately or removed from the site if further maintenance is required. A daily checklist will be maintained by operators for their equipment;
- Drip pans or absorbent pads will be used during vehicle and equipment maintenance work;
- Maintenance areas will have spill kits and/or use other spill protection devices;
- If maintenance is required away from the central maintenance shop, maintenance areas will be located at least 100 feet from downstream drainage facilities and waterways; and
- Absorbent spill clean-up materials will be available in maintenance areas and will be disposed of properly after use.

7.1.4 Coordination of BMPs and Reclamation Operations

Structural BMPs will be coordinated with reclamation activities, so the BMPs will be in place before reclamation begins. The BMPs placed prior to reclamation activities will be placed away from and downgradient enough to allow an operating perimeter so that equipment can operate safely and efficiently without damage to the BMPs. After the reclamation operations are complete for an area, the BMPs will be relocated to the edge of the newly reclaimed areas.

Structural BMPs proposed for the Project may include, but are not limited to, sediment basins, diversion channels, berms, wattles, straw bales, silt fence, and other appropriate stormwater control features as shown in **Figure 38**.

The following BMP coordination with reclamation activities will occur:

- The temporary downgradient perimeter controls (i.e., wattles, straw bales, etc.) will be installed before grading and recontouring begin;
- Once reclamation activities cease permanently in an area, that area will be stabilized (i.e., permanent seed and mulch, soil amendments, revegetation); and
- The temporary perimeter controls will not be removed until reclamation activities are complete, and soils have been stabilized.

7.2 Contemporaneous Reclamation - 19.10.6.603B

Contemporaneous reclamation is required to the maximum extent practicable and in a manner that is consistent with the approved reclamation plan.

Contemporaneous reclamation will be implemented by RHR to the maximum extent practicable, as described in Section 6.5. However, in an underground mining operation, such as the Project, opportunities for contemporaneous reclamation are limited relative to a surface mining operation. Many areas disturbed early in the life of the Project will remain disturbed until mine closure and reclamation. Since the majority of activity will take place below the surface, a relatively small percentage of Project operation affects surface resources.

Surface disturbances will consist of the administrative and support facilities, WTP, and ponds, excavation material stockpiles, roads, utility corridors, surface water flow channels and retention basins, retention ponds, and other facilities as described in more detail in Section 3.2. Most of these areas must remain as constructed until mining operations cease and final site reclamation begins.

The approach to contemporaneous reclamation is to avoid and minimize site disturbance where possible. Contemporaneous reclamation will be initiated with topsoil salvage and continue through mine operations with protection and maintenance of excavation material stockpiles, closure and reclamation of dewatering wells when they are no longer needed, and reclamation of drill sites as soon as possible after drilling. This early reclamation reduces erosion, isolates and protects material for later use, provides mitigation of potential effects, and reduces the final reclamation work and costs. The protection and maintenance of material stockpiles are discussed in the following paragraphs.

7.2.1 Topsoil

Topsoil will be salvaged as detailed in Section 3.2.2 to the extent it exists in each area. A total of approximately 584,833 cubic yards of topsoil is estimated to be required to cover the total disturbance area of 305 acres with 12 inches of topsoil. This estimate is conservative, as some disturbed areas, such as roadways, water catchments, and channels, may be retained after completion of the Project to benefit the post-mining land use of grazing.

Based on available soil data and field observations, sufficient topsoil is anticipated within the disturbance area to achieve the 12-inch target thickness. Topsoil depths across the Project area are generally adequate, and material will be salvaged to the full depth of suitability where present to increase recovery. Topsoil stockpiles will be surveyed during operations to quantify recovered volumes, and reclamation planning will be refined, as appropriate, based on actual salvage quantities.

Clearing disturbed areas will begin with the removal of existing vegetation within designated facility footprints. This will be followed by the collection of suitable topsoil during site grading activities. Suitable topsoil has been identified in the project area.

Prior to topsoil salvage, designated salvage areas will be clearly staked in the field to guide equipment operators. The goal is to recover up to 584,833 cubic yards of topsoil. Many locations within the planned 305-acre disturbance area contain suitable topsoil to depths exceeding 24 inches. These areas will be identified and marked, and material will be salvaged to the full depth of suitability to maximize recovery and support the availability of quality material for reclamation.

Salvaged topsoil will be segregated and stored in a stockpile designated and labeled for topsoil only. Topsoil from roads, ventilation/escape shaft pads, and the WTP area will be added to an existing stockpile or placed in localized areas if transport of the topsoil is impractical. The stockpiles will be stabilized with grass cover until ready for use. **Table 24** displays the seed mix to be used for temporary soil stockpile cover. The final cover will consist of grass species that are well adapted to the regional climate and soil conditions and are known for their ability to establish quickly on disturbed soils. The vegetation will reduce erosion while providing microhabitat for beneficial soil organisms. Diversion ditches will be constructed around the stockpiles, where necessary, to minimize stormwater run-on and run-off erosion.

7.2.2 Sub-Base Rock

After the topsoil has been removed from a disturbed area, further excavation will be performed by removing the sub-base rock to the required depth. A predetermined cut and fill grading plan will be used for the large operational facilities, WTP, smaller vent fan pads, and roads, per Section 3.2. Sub-base rock not used as fill to obtain the desired grade during facility construction will be stockpiled and labeled. Diversion ditches around the stockpiles will be constructed where necessary to minimize stormwater run-on erosion and contain runoff from the stockpile. The volume of sub-base rock is anticipated to be minimal based on the depth to bedrock provided in the BDR (RHR, 2020). Some of this material may be used as rip rap and/or crushed and used for road base. Should additional material be required, it will be imported to site sourced from existing, permitted commercial aggregate quarries located within the regional Project vicinity.

7.2.3 Non-Ore Development Rock

The production shafts and the ventilation/escape shafts will be excavated as described in Sections 3.1.4 and 3.1.5. Shaft excavation material brought to the surface will be stockpiled separately in non-ore development rock stockpiles. Once the underground development has progressed to a point when backfill material is needed, this material may be used for stability in mined-out areas. Alternatively, the material may be loaded into over the highway haul trucks and transported from the Project area to be processed as ore at the White Mesa Mill. The temporary stockpile areas will be reclaimed consistently with the procedures and materials described in previous sections of the proposed Plan.

The non-ore development rock material produced during the mining operations is discussed in Section 3.2. It will be stockpiled onsite until mine development has progressed to the point of needing backfill. Some non-ore development rock will remain underground to help backfill mined-out areas.

Over the mine life, an estimated total of 2.24 million tons of backfill will be needed. Of this total, 387,000 tons of underground development waste will be directly placed into stopes. The surface development waste stockpile will contribute 516,000 tons, which includes hoisted waste, surface excavations, production shafts, and other mine surface structure excavations. The remaining 1.34 million tons will be sourced from existing, permitted commercial aggregate quarries located within the regional Project vicinity.

7.2.4 Contemporaneous Reclamation Schedule

The final reclamation schedule will begin after the completion of mining operations. Since the operation will establish temporary stockpiles during construction, and facilities and infrastructure will be utilized throughout mining operations, there will be little opportunity for contemporaneous reclamation to take place other than concurrent backfilling of mine workings as previously described. However, RHR will continually seek opportunities and conditions to conduct contemporaneous reclamation operations.

7.3 Assure Protection - 19.10.6.603C

The mining operation and completed reclamation shall meet the following requirements established to assure protection of human health and safety, the environment, wildlife and domestic animals.

7.3.1 Signs, Markers and Safeguarding - 19.10.6.603(1)(a-f)

Signs, Markers and Safeguarding Measures will be taken to safeguard the public from unauthorized entry into shafts, adits, and tunnels and to prevent falls from highwalls or pit edges. Depending on site-specific characteristics, the following measures shall be required:

- (a) closing shafts, adits or tunnels to prevent entry;*
- (b) posting warning signs in locations near hazardous areas;*
- (c) restricting access to hazardous areas;*
- (d) marking the permit area boundaries;*
- (e) posting a sign at the main entrances giving a telephone number of a person to call in the event of emergencies related to the mine; or*
- (f) other measures as needed to protect human safety.*

To protect the public from potential hazards associated with mining operations, a comprehensive system of signs, markers, and safeguarding measures will be implemented starting with limiting access to the mine to employees and vendors. These measures are designed to prevent unauthorized access to hazardous areas such as shafts, adits, tunnels, and to verify that personnel and visitors are protected from site-specific risks.

Access to the Project area will be controlled from initial construction activities through mining and reclamation operations to maintain public safety. This is necessary due to potential hazards such as heavy equipment operation, truck traffic, and other site activities that pose risks to untrained individuals. Personnel entering the site will be required to check in and complete site-specific safety training. No individual will be permitted unescorted access to the Project area until they have received adequate training, orientation, and formal company approval. Access will be limited to designated areas and tasks specific to each individual's role and level of authorization.

During reclamation operations, after the site buildings are removed, a temporary field office will be used as a control point for workers and visitors. If a visitor requires entrance beyond the office, the reclamation personnel will accompany them. The access points not being used during reclamation will remain locked. Warning signs will remain in place throughout reclamation and will only be removed once the associated hazards, such as open shafts, have been fully mitigated or removed. These signs will be updated as necessary to reflect changing site conditions. Fencing and other physical barriers will be used to restrict access to hazardous areas and will be adjusted during reclamation work to maintain safety.

Production and ventilation shafts will be permanently closed using engineering methods that prevent unauthorized entry and support long-term safety. These closures will be implemented in accordance with standard engineering practices and are detailed in Section 6.1.3.

Project boundaries will be marked with signs and prominent markers, especially where fencing is not installed. At the main entrance to the site, signage will include the Project name, operator information, and a telephone number for emergency contact. The placement and design of signs and markers on NFS lands will be coordinated with the USFS to comply with applicable regulation and policies. These signs will be maintained in good condition and updated as needed to sustain visibility and accuracy.

Additional safeguarding measures, such as radiological surveys, will be conducted in accordance with the Post Mine Radiological Surveys Plan in **Appendix F** to confirm that no residual hazards remain.

7.3.2 Wildlife Protection - 19.10.6.603C(2)(a-c)

Wildlife Protection Measures shall be taken to minimize adverse impacts on wildlife and important habitat. Based on site-specific characteristics, the following measures will be required:

- (a) restricting access of wildlife and domestic animals to toxic chemicals or otherwise harmful materials;*
- (b) minimizing harm to wildlife habitat during mining; and*
- (c) reclaiming areas of wildlife habitat if not in conflict with the approved post-mining land use.*

The Project area occurs within New Mexico Department of Game and Fish Game Management Unit (GMU) 9, which supports a variety of wildlife species including mule deer and elk that utilize U.S. Forest Service lands in the vicinity of the Project. Wildlife protection and reclamation measures described in this section are intended to minimize impacts to these species and their habitat during construction, operations, and reclamation. Post-mining land use and reclamation activities will be implemented in coordination with the USFS and will support the continued use of the area by wildlife consistent with surrounding land uses.

The following design features and mitigation measures will be implemented during construction, operations, and reclamation to minimize impacts to wildlife and wildlife habitat:

- Surface disturbance and vegetation removal will be limited to the minimum area necessary for construction of roads, utilities, and mine facilities.
- Surface grading and reclamation activities will incorporate erosion control and geomorphic design principles to minimize long-term habitat disturbance and promote stable landforms.
- Hazardous materials, fuels, and chemicals will be stored in appropriate containers with secondary containment to prevent wildlife exposure.
- Water management features associated with mining activities will be designed and managed to minimize wildlife exposure to contaminated water and other hazardous conditions.
- Water management features will be designed to minimize wildlife exposure and entrapment. Lined ponds associated with the WTP and retention ponds will be fenced or otherwise controlled to limit wildlife access. Unlined retention basins will be constructed with side slopes, escape ramps, or other appropriate features to allow for wildlife egress. Wildlife deterrents may also be used, as necessary.
- Vehicle speeds on site roads will be controlled, where practicable, to reduce the potential for wildlife collisions.
- Pre-disturbance surveys will be conducted, as appropriate, by qualified biologists to identify active migratory bird and raptor nests in areas proposed for disturbance. Surveys will be conducted using generally accepted survey protocols during the appropriate survey season for the target species. If active nests are identified, appropriate avoidance buffers and any necessary seasonal restrictions will be implemented in accordance with applicable regulatory guidance and in coordination with the appropriate land management agency and the New Mexico Department of Game and Fish. If nests, dens, or burrows are encountered during construction or operational activities, work will be halted in the immediate area and appropriate resource specialists will be consulted to determine appropriate avoidance or mitigation measures.
- Noise-generating equipment will be operated and maintained in accordance with manufacturer specifications to minimize unnecessary disturbance to wildlife.
- Underground mine openings and associated infrastructure will be designed and closed in a manner that prevents wildlife entrapment and minimizes hazards to bats and other species.
- Window decals on facilities, sprays, or film (where safe to do so) to prevent bird strikes
- Overhead electric supply lines will be designed and constructed to be raptor-safe in accordance with applicable industry guidance to minimize the risk of electrocution and collision.

- Any new overhead power line structures will be designed and constructed to be raptor-safe in accordance with applicable industry guidance (e.g., Avian Power Line Interaction Committee). Avian deterrent devices or design methods will be incorporated, as appropriate, to minimize the risk of electrocution.
- Lighting associated with surface facilities will be designed to minimize impacts to wildlife, including the use of downward-directed, shielded fixtures to reduce light spill and glare. Lighting will be limited to the minimum necessary for safe operations and, where practicable, directed away from surrounding habitats.

The wildlife protection measures outlined in Section 3.3 addressing the accidental release of hazardous materials will remain in place during reclamation. During closure, products and materials used during operations that have potential to affect wildlife or habitat will be removed from the site and disposed of in an approved and licensed facility. Overhead electric supply lines may remain onsite, decided upon by the utility company and landowners.

The proposed reclamation plan incorporates best practices that will be maintained throughout reclamation activities. These include minimizing land disturbance and ensuring that reclaimed areas are revegetated with plant species that support both livestock grazing and wildlife habitat through enhanced plant diversity, cover, and productivity. Reclamation design will also consider the surrounding wildlife use of the area, including large ungulates known to occur in the region, by producing accessible slopes, forage availability, and habitat connectivity consistent with surrounding conditions.

No open water ponds will remain following reclamation, except for pre-existing stock ponds, which may be reconstructed to their original, pre-mining conditions.

Reclamation activities will follow the Habitat Guidelines for Mine Operations and Reclamation (NMDGF, 2004) to minimize potential adverse effects to wildlife and their habitat. Mitigation strategies will include creating topographic variability during grading, rather than traditional smooth slopes, to reflect the natural geomorphic character of the area. Where feasible, features such as undulating profiles, niches or ledges on slope faces, brush piles, and rock piles will be incorporated.

Plant species selected for reclamation will be appropriate for the Project site, capable of successful re-establishment, and non-invasive. The seed mix described in Section 7.7 will be used for revegetation and will consist of species adapted to local soils, climate, and post-mining land use. Seed and mulch used for reclamation will be certified weed-free, and the final seed mix will be coordinated with and approved by the USFS.

Weed control measures will be implemented to prevent the introduction and spread of noxious weeds, particularly those harmful to livestock and wildlife. RHR will coordinate with the USFS to implement and maintain an effective noxious weed management program for the Project. The Weed Control Plan (**Appendix I**) will include procedures for inventory and monitoring of weeds at regular intervals throughout the life of the mine so that infestations can be identified and treated in a timely manner to prevent their spread onto adjacent public lands.

7.3.3 Cultural Resources - 19.10.6.603C(3)

RHR recognizes the sensitivity and importance of the presence of cultural properties on the Project area. RHR conducted multiple archaeological surveys of the entire Project area and designed its surface facilities to avoid archaeological sites wherever possible. The surveys produced a list of sites eligible for listing on the National Register of Historic Places (NRHP) on the New Mexico State Register of Cultural Properties (NMSRCP). RHR is working with the appropriate State and Federal authorities to make sure these sites are protected or that mitigations to address adverse effects are followed for those sites that cannot be avoided.

As part of the EIS process initiated by the USFS, cultural resource investigations and consultation have been conducted pursuant to Section 106 of the National Historic Preservation Act (36 CFR Part 800). Beginning in 2011, the USFS, in coordination with the State of New Mexico and consulting archaeologists, evaluated potential impacts of the proposed Roca Honda Mine on archaeological sites and cultural properties within the Project area. Site visits and cultural resource surveys were conducted to evaluate the relationship between identified archaeological sites and proposed mine facilities. As a result of these evaluations, RHR modified aspects of the Project design, including rerouting access roads and corridors, modifying fencing plans to isolate sites from potential disturbance, and adjusting the location of stockpiles and other surface facilities to further avoid cultural resources where practicable. Additional cultural resource surveys have also been conducted in areas added to the Project following the acquisition of mineral rights in Section 17 and along the treated water pipeline corridor.

The Project area is located within the broader cultural landscape associated with the Mount Taylor Traditional Cultural Property (TCP), which is eligible for listing on the NRHP and is listed on the NMSRCP. Mining activities associated with the Project may result in indirect or setting effects to historic properties, including the Mount Taylor TCP. These effects may include visual changes to the landscape, noise from equipment and operations, and other alterations to the surrounding environment that could affect the integrity of historic properties.

Design and operational measures will consider potential impacts to the visual and scenic integrity of the Mt. Taylor TCP. Where practicable, facilities will be sited and constructed to minimize visual contrast with the surrounding landscape, including the use of visually compatible materials and colors and minimization of lighting effects.

RHR will continue to work with the USFS, the New Mexico State Land Office (NMSLO), the NM SHPO, consulting Tribes, and other consulting parties through the Section 106 consultation process to identify, evaluate, and minimize or mitigate potential adverse effects to historic properties. Completion of the Section 106 process and determinations regarding historic properties will be made by the USFS as the lead Federal agency.

Through the cultural resource surveys and consultation process, RHR, in coordination with the USFS and State archaeologists, identified eleven sites (of the 193 sites recorded during the surveys) that required closer evaluation due to their proximity to proposed mining activities. These sites will be further investigated, and avoidance and mitigation plans will be developed to protect the sites during construction, operations, and reclamation.

For sites that cannot be avoided, mitigation measures will be implemented to address adverse effects. These measures may include data recovery (excavation) conducted prior to construction. Data recovery efforts will be conducted by qualified archaeologists permitted by the USFS or the State of New Mexico, as appropriate. Data recovery will be carried out in accordance with plans approved by the applicable permitting agency. Data recovery plans for sites located on State of

New Mexico lands will also be approved by the Cultural Properties Review Committee. The NM SHPO will review these plans and provide concurrence regarding their adequacy.

7.3.4 Hydrologic Balance – 19.10.6.603.C.(4) (a)-(d)

Operations shall be planned and conducted to minimize change to the hydrologic balance in both the Project and potentially affected areas. If not in conflict with the approved post-mining land use, reclamation shall result in a hydrologic balance similar to pre-mining conditions unless non-mining impacts have substantially changed the hydrologic balance.

- (a) Operations shall be designed so that non-point source surface releases of acid or other toxic substances shall be contained within the permit area, and that all other surface flows from the disturbed area are treated to meet all applicable state and federal regulations.*
- (b) The disturbed areas shall not contribute suspended solids above background levels, or where applicable the Water Quality Control Commission's standards, to intermittent and perennial streams.*
- (c) To provide data to determine background levels for surface water entering the permit area, appropriate monitoring shall be conducted on drainages leading into the permit area.*
- (d) All diversions of overland flow shall be designed, constructed and maintained to minimize adverse impacts to the hydrologic balance and to assure the safety of the public.*
 - (i) No diversion shall be located so as to increase the potential for landslides.*
 - (ii) Unless site-specific characteristics require a different standard which is included in the approved permit, diversions which have watersheds larger than 10 acres shall be designed, constructed and maintained to safely pass the peak runoff from a 10-year, 24- hour precipitation event.*
 - (iii) All diversion designs which have watersheds larger than 10 acres shall be certified by a professional engineer registered in New Mexico as having been designed in accordance with 19.10 NMAC. Diversion designs shall be kept on-site or otherwise be made available, upon request, to the Director for inspection.*
 - (iv) When no longer needed, temporary diversions shall be removed and the disturbed area reclaimed.*

Mine operations surface facilities were designed and located to avoid disturbance of and minimize potential effects to surface hydrologic resources. This includes minimizing alteration of arroyos, springs, and stock ponds, as described in Section 3.2. To the extent possible, surface water will be routed around disturbed areas via constructed diversion channels. Surface water entering the Project area that does not contact disturbed ground will continue to flow through and exit the Project area in its natural channels during operations. Water that encounters disturbed ground or potentially contaminating material will be captured as previously discussed. Retention basins and other stormwater management features will be installed to control runoff and flow rates, as described in Section 3.4 and the Surface Water Management Plan provided in **Appendix B**. If desired and approved by the landowners, these basins may be retained post-mining to enhance hydrologic stability and support wildlife use.

After operations have ceased, mine water will no longer be discharged. Natural drainage patterns will be restored, and disturbed areas will be returned to grazing land use.

Non-point surface releases will be contained within the Project area in retention ponds, and only clean stormwater or treated surface water will leave the area. Materials excavated as part of mine

operations will be retained within the Project area in constructed stockpiles and reclaimed as part of the contemporaneous reclamation operations. Stormwater from disturbed areas that may contact potentially contaminated materials will be directed to lined ponds for containment and, if necessary, treatment at the WTP. Stormwater from other disturbed areas will be managed using stormwater control measures and BMPs such as diversion channels, swales, retention basins, sediment traps, and erosion control measures. These facilities will be among the last facilities to be reclaimed.

A SWPPP will be developed to guide stormwater management during construction, operations, and reclamation. The SWPPP will identify monitoring locations, parameters, monitoring frequency, and corrective actions to verify compliance with applicable regulatory requirements. BMPs will be used to control suspended solids and prevent erosion. These include regrading, runoff control swales, retention basins, seeding and mulching, erosion control wattles, chemical soil stabilization, and sediment traps. Operational BMPs will remain in place during reclamation until areas are stabilized, and new BMPs will be installed as needed to prevent rill and gully formation until vegetation is established.

Surface water monitoring will be conducted on a phase-based schedule, including operational (event-based and periodic), reclamation (event-based and semi-annual), and post-closure (annual or as required) monitoring, consistent with the NPDES discharge permit and the SWPPP.

Diversions of overland flow have been designed and constructed to minimize adverse impacts to the hydrologic balance and support public safety. In Sections 17 and 16 of the Project area, diversion channels and retention basins have been constructed to redirect overland flow away from disturbed areas and into existing arroyos. These features will remain in place during reclamation until final affected areas are stabilized, after which they will be filled and regraded to match final site contours. The regraded areas will be protected with erosion control measures such as straw bales, wattles, or other BMPs until the vegetation is established.

Diversions have been located to avoid increasing potential for landslides. They have been designed in accordance with 19.10.6.603.C.(4), including the requirement that diversions draining watersheds larger than 10 acres safely pass the peak runoff from a 100-year, 24-hour precipitation event unless site-specific conditions require a different design standard. Once no longer needed, temporary diversions will be removed, regraded, and reclaimed to match the geomorphic character of the surrounding area.

7.3.5 Stream Diversions – 19.10.6.603.C.(5) (a)-(c)

When streams are to be diverted, the stream channel diversion shall be designed, constructed, and removed in accordance with the following:

- (a) unless site-specific characteristics require different measures to meet the performance standard and are included in the approved permit, the combination of channel, bank and flood plain configurations shall be adequate to safely pass the peak run-off of a 10-year, 24-hour precipitation event for temporary diversions, a 100-year, 24-hour precipitation event for permanent diversions;*
- (b) the design and construction of all intermittent and perennial stream channel diversions shall be certified as meeting 19.10 NMAC by a professional engineer registered in New Mexico. As-built drawings shall be completed promptly after construction and be retained on site or otherwise made available upon request to the Director; and*
- (c) when no longer needed, temporary stream channel diversions shall be removed and the disturbed area reclaimed.*

No perennial stream channels exist within the Project area. However, several ephemeral arroyos are located near the planned disturbed areas. Aerial topography and ground surveys were used to identify the existing conditions of these arroyos.

As part of reclamation, arroyo reconstruction will take place where the system was affected by mine disturbance. The existing bank elevations of the arroyos will remain, and the interior side slopes will be reconstructed to 3H:1V. The bottom inverts will match the original contours. The reconstructed arroyo will meet the geomorphic character of the surrounding area and will end at the location at which it turns into sheet flow. An energy dissipater similar to the one shown in **Figure 39** will be added to the point where the arroyo ends to enhance the transfer to sheet flow. The remainder of the improved channel will be filled and regraded to match the surrounding topography.

Temporary diversions will be designed and constructed to safely pass the peak runoff from a 100-year, 24-hour precipitation event, unless site-specific conditions require a different standard.

Although there are no intermittent or perennial streams within the Project area, stream channel diversions will be constructed in accordance with 19.10 NMAC and certified by a professional engineer registered in New Mexico. As-built drawings will be completed promptly after construction and be retained onsite.

When no longer needed, temporary surface water diversions will be removed. The disturbed areas will be regraded and reclaimed to match the geomorphological character of the region.

7.3.6 Impoundments – 19.10.6.603.C.(6) (a)-(b)

If impoundments are required, they shall be designed, constructed and maintained to minimize adverse impacts to the hydrologic balance and adjoining property and to assure the safety of the public.

- (a) Unless site-specific characteristics require different measures to meet the performance standard and are included in the approved permit, impoundments having earthen embankments but not subject to the jurisdiction of the Mine Safety and Health Administration or the State Engineer shall:*
 - (i) have a minimum elevation at the top of the settled embankment of 1.0 foot above the water surface in the pond with the spillway flowing at the design depth;*
 - (ii) have a top width of the embankment not less than 6 feet;*
 - (iii) have combined upstream and downstream side slopes of the settled embankment not less than 5 horizontal: 1 vertical with neither slope steeper than 2 horizontal: 1 vertical. Slopes shall be vegetated or otherwise stabilized to control erosion;*
 - (iv) have the embankment foundation cleared of all vegetative matter, all surfaces sloped to no steeper than 1 horizontal: 1 vertical and the entire foundation area scarified;*
 - (v) have fill material free of vegetative matter and frozen soil;*
 - (vi) have spillways provided to safely discharge the peak runoff of a 25-year, 24-hour precipitation event, or an event with a 90-percent chance of not being exceeded for the design life of the structure; or*
 - (vii) have other site-specific design criteria for embankments as long as they result in a minimum static safety factor of 1.3 with water impounded to the design level;*
 - (viii) be designed and certified by a professional engineer registered in New Mexico as having been designed and constructed in accordance with 19.10 NMAC. As-built drawings shall be completed promptly after construction and be retained on site or*

- otherwise made available upon request to the Director; and*
- (ix) if necessary for sediment control be, in place before any other disturbance to the watershed for the impoundment.*
- (b) When no longer required, impoundments shall be graded to achieve positive drainage unless:*
- (i) the surface estate owner has requested in writing that they be retained;*
 - (ii) they are consistent with the approved reclamation plan; and*
 - (iii) they are appropriate for the post-mining land use or the self-sustaining ecosystem.*

Impoundments will be designed, constructed, and maintained to minimize potential adverse effects to the hydrologic balance and adjoining property and to assure the safety of the public. The general layout and location of impoundments are described in Section 3.2, and the design and reclamation requirements are described in this section.

The landowners will be consulted to determine whether impoundments should be retained as enhancements to the post-mining land use of livestock grazing and wildlife habitat. If retained, the impoundments will remain consistent with the proposed Reclamation Plan and will support post-mining land use. If the landowners do not wish to retain the impoundments, treatment ponds, retention ponds, and retention basins, they will be filled and graded to match the geomorphic character of the surrounding landscape.

Material used to fill the impoundments will be sourced from the impoundment embankments and from stockpiles of inert materials developed and maintained during mine development and operation. These materials will consist of non-mineralized rock and soil. Fill will be placed in lifts of 24 inches or less, moistened, and compacted using wheel-rolling equipment for stability. This process will continue until the impoundments are backfilled to approximately four feet below the surrounding land surface. Topsoil or sub-base rock will then be placed from stockpiles to a depth of approximately three feet, followed by placement of approximately 12 inches of topsoil. The area will then be graded to match the geomorphic character of the surrounding topography. The areas will then be lightly ripped or disked, seeded with the approved seed mix at prescribed rates, mulched with weed-free mulch, and the mulch will be crimped into the soil or stabilized with a tackifier.

Retention ponds and the WTP ponds will be lined during their construction. If, at the time of closure, the retention ponds contain water, the water will be characterized and treated as necessary by pumping it to the treatment facility prior to discharge. The retention pond bottom solids and liners will be removed and disposed of in approved offsite landfills. The ponds will be reclaimed as discussed in the previous paragraph.

When the WTP is no longer needed, its associated ponds will be closed. Pond sediment and liners will be removed and disposed of in approved and licensed offsite landfills. The ponds will be reclaimed as described above.

Retention basins will not be lined, as they are intended to collect only stormwater that has not contacted potentially contaminated areas such as mineralized material stockpiles, process areas, or other operational facilities. These basins are distinct from lined retention ponds associated with operational areas where stormwater may contact potentially impacted materials and therefore require containment and potential treatment. Stormwater captured in retention basins will slowly dissipate naturally into the ground, similar to runoff behavior in surrounding arroyos. The primary purpose of the retention basins is to attenuate and control runoff from non-contact disturbed areas.

At reclamation, the retention basins will be drained, the overflow structures removed, and the basins filled and regraded as discussed above. These basins may be retained for use as livestock or wildlife water sources if desired by the landowners. Otherwise, they will be reclaimed and recontoured as described above.

The locations and general layout of stormwater management features, including retention basins and retention ponds, are described in Section 3.4 and Surface Water Management Plan provided in **Appendix B**, and inspection and maintenance will occur in accordance with the Project SWPPP.

7.3.7 Minimization of Mass Movement – 19.10.6.603.C.(7)

Man-made piles such as waste dumps, topsoil stockpiles and ore piles shall be constructed and maintained to minimize mass movement.

As described in Section 3.2, man-made slopes and stockpiles will be constructed to prevent mass movement. To minimize mass movement of reclaimed slopes or fill areas is minimized, the fill areas will be constructed in 24 inches or less lift, with the addition of water, and each lift wheel rolled to achieve compaction. Since the areas will not be required to support structures or weight other than overlying material, these procedures will be adequate to prevent mass movement.

The soil and rock stockpiles will be used as part of the final reclamation for fill and vegetation growth. No stockpiles will remain on the surface in the Project area after final reclamation.

7.3.8 Riparian and Wetland Areas – 19.10.6.603.C.(8)

Disturbance to riparian and wetland areas shall be minimized during mining. Adverse effects to riparian and wetland areas shall be mitigated during reclamation unless the mitigation conflicts with the approved post-mining land use.

During baseline data investigations within the mine Project area, no riparian and wetland areas, as defined by the Clean Water Act Section 404, were identified within the Project area.

The proposed water reuse pipeline route to the Rio San Jose would cross numerous ephemeral waterways, and at least two intermittent waterways. In late 2014, a detailed review of each waterway was conducted in the Project area. In the spring of 2015 Marron and Associates, Inc., (Marron) completed wetland determinations and delineations within those waterways where wetland characteristics were present. These determinations were completed using the format and data forms presented in the U.S. Army Corps of Engineers (USACE) Arid West Region Wetland Delineation Manual. BDR Addendum 1 - Appendix A-3 Wetland Determination and Delineation, Proposed Pipeline Corridor, submitted July 24, 2018, presents the findings of those determinations and delineations.

7.3.9 Roads – 19.10.6.603.C.(9) (a)-(c)

Roads shall be constructed and maintained to control erosion.

(a) Drainage control structures shall be used as necessary to control runoff and to minimize erosion, sedimentation and flooding. Drainage facilities shall be installed as road construction progresses and shall be capable of safely passing a 10-year, 24-hour precipitation event unless site-specific characteristics indicate a different standard is

appropriate and is included in the approved permit. Culverts and drainage pipes shall be constructed and maintained to avoid plugging, collapsing, or erosion.

- (b) Roads to be constructed in or across intermittent or perennial streams require site-specific designs to be submitted with the permit application.*
- (c) Roads to be made permanent must be approved by the surface owner and be consistent with the approved post-mining land use.*

Section 3.4.3 describes how roads will be constructed and maintained to control erosion, and to meet the applicable regulatory requirements.

Some roads constructed for the mine will support the management of lands for livestock grazing operations and are therefore consistent with the approved post-mining land use. The landowners will be contacted by RHR to determine whether roads should be made permanent after mining operations conclude. If the landowners request that certain roads be made permanent, RHR will submit a formal request to the NMMMD for approval.

7.3.10 Subsidence Control – 19.10.6.603.C.(10)(a)-(b)

Underground and in situ solution mining activities shall be planned and conducted, to the extent technologically and economically feasible, to prevent subsidence which may cause material damage to structures or property not owned by the operator.

- (a) Underground and in situ solution mining activities near any aquifer that serves as a significant source of water supply to a public water system shall be conducted to avoid disruption of the aquifer and consequent exchange of ground water between the aquifer and other strata.*
- (b) Underground and in situ solution mining activities conducted beneath or adjacent to any perennial stream must be performed in a manner so that subsidence is not likely to cause material damage to streams, water bodies and associated structures.*

Underground mining activities at Roca Honda will be planned and constructed in a manner to prevent subsidence and damage to structures and/or property not owned by RHR.

The target ore zone of the Roca Honda mine is contained within sandstones of the Westwater Canyon Member of the Morrison Formation at a depth of approximately 1,650 to 2,600 feet bgs at the mine site. Between the Westwater Canyon Member and land surface are approximately 2,000 feet of primarily shale with thinner sandstone layers. Mining will occur only within sandstones of the Westwater Canyon Member, and lateral drifts will be restricted to that geologic unit. The vertical depth to the mining area from the surface makes it highly unlikely that mining activities will cause surface subsidence to occur.

The Roca Honda mining activities will be conducted to avoid disruption of aquifers above the ore body and exchange of groundwater between the formation being mined and overlying aquifers. The Roca Honda mine shaft, ventilation holes, and dewatering wells will pass through three saturated geologic units which function as aquifers in parts of the San Juan Basin. From highest to lowest in the geologic section, these units are the Gallup Sandstone, the Dakota Sandstone, and the Westwater Canyon Member of the Morrison Formation. Groundwater within these units is expected to occur under artesian conditions. As described in more detail in Section 3.1.3, RHR will depressurize the Gallup Sandstone, Dakota Sandstone, and Westwater Canyon Member. This activity will result in groundwater level drawdown in the vicinity of the mine. Extensive evaluation of groundwater occurrences within the Project area and modeling of drawdown effects from mining has been completed under the direction of a technical advisory group consisting of

representatives from the OSE, NMED, MMD and the USFS. The initial model was updated after RHR acquired the minerals under Section 17 and described in a Technical Memorandum entitled Assessment of Potential Impacts from Dewatering at the Roca Honda Mine, INTERA Inc. April 20, 2017. That memorandum was included as Appendix E-1 of the 2018 BDR Supplement submitted to the MMD. The updated model concluded that mine dewatering “will have (1) negligible impacts on groundwater levels at the public water supplies for Crownpoint and Gallup or at the pueblos of Laguna and Acoma, (2) essentially no impact on springs- including Horace Springs, and (3) negligible impact of groundwater flow to rivers with perennial reaches, including the San Juan River, Rio San Jose, Puerco River, and Rio Puerco”.

Development drill holes will be plugged and abandoned in accordance with NMOSE requirements which are intended to prevent potential cross contamination of aquifers.

The Roca Honda Mine is not located beneath or adjacent to a perennial stream or water body. The closest intermittent stream, San Mateo Creek, is located two miles to the south of the mine area. The sources of the creek waters are runoff from precipitation on Mt. Taylor.

Impact to the ground surface or aquifers is not expected due to subsidence, as a result of mining activities.

7.3.11 Explosives Blasting – 19.10.6.603.C.(11)

Blasting shall be conducted to prevent injury to persons or damage to property not owned by the operator. Fly rock shall be confined to the Project area. The Director may require a detailed blasting plan, pre-blast surveys or specify blast design limits to control possible adverse effects to structures.

The use of explosives for construction and mining is discussed in Section 3.1. No explosive use is anticipated for reclamation.

7.4 Site Stabilization and Configuration - 19.10.6.603D

The permit area shall be stabilized, to the extent practicable, to minimize future impact to the environment and protect air and water resources. The final surface configuration of the disturbed area shall be suitable for achieving a self-sustaining ecosystem or approved post-mining land use.

The proposed Reclamation Plan describes in detail how the Project area will be stabilized to minimize the potential for future effects on the environment and to protect air and water resources. The final surface configuration of disturbed areas will meet the geomorphological character of the region and surrounding areas and will be suitable for achieving the approved post-mining land use of livestock grazing and wildlife habitat. Final Slopes and Drainage Configuration – 19.10.6.603.D.(1)

Final slopes and drainage configurations must be compatible with a self-sustaining ecosystem or approved post-mining land use.

Final slopes and drainage configurations will be constructed to conform with the geomorphic character of the region and surrounding area and will be compatible with the approved post-mining land use of livestock grazing and wildlife habitat while supporting the development of a self-sustaining ecosystem on reclaimed areas.

7.4.1 Backfilling – 19.10.6.603.D.(2)

Backfilling or partial backfilling shall be required only when necessary to achieve reclamation objectives that cannot be accomplished through other mitigation measures.

Underground mine workings, shafts, impoundments, roads and other depressions will be backfilled, as described in the proposed Reclamation Plan to meet stability requirements and the geomorphic character of the region and surrounding areas.

7.4.2 Minimizing Mass Movement – 19.10.6.603.D.(3)

Reconstructed slopes, embankments and roads shall be designed, constructed and maintained to minimize mass movement.

Prevention of mass movement of reclaimed slopes, embankments, roads or other fill areas will be achieved through the construction of fill areas in lifts of 24 inches or less, moistened, and wheel-rolled to achieve compaction. Since the areas will not support structures or weight other than overlying material, these procedures will be adequate to prevent mass movement.

The soil and rock stockpiles will be used as part of the final reclamation for fill and vegetation growth. No stockpiles will remain on the surface in the Project area after final reclamation.

7.4.3 Toxic Drainage Formation – 19.10.6.603.D.(4)

Measures must be taken to reduce, to the extent practicable, the formation of acid and other toxic drainage that may otherwise occur following closure to prevent releases that cause federal or state standards to be exceeded.

As discussed in Section 7.0 of the BDR (RHR, 2020) and Section 6.4, historically, acid mine drainage has not been a problem in the Grants Mineral Belt. While some sulfides are known to exist in the rock formations of the Project area, acid neutralization potential exceeds acid generation potential.

During operations, RHR will characterize excavated materials as a condition of an approved NMED Groundwater Discharge Permit. The excavated material will be analyzed to determine the potential for acid generation or constituents of concern. Material excavated during construction of the mine shafts and vent holes will be temporarily stored in designed stockpiles to prevent mass movement and protected from stormwater run-on. If the material is inert, it will be returned to the mine and used to backfill areas for stability during mining. If the analytical results indicate that acid-generating or other constituents of concern could be leached, the material may be placed back in the mine workings, capped in place, or alternatively taken offsite for disposal. Runoff from these stockpiles will be collected in stormwater retention ponds. Water that does not evaporate will be treated in the on-site WTP for treatment before it is discharged. The bottom sediment from the ponds will be analyzed for constituent makeup and disposed of appropriately in an offsite facility. Alternatively, if sediment is inert, it may be used as soil amendment, if not placed in underground mine workings. Consequently, material with the potential to release acid and other toxic drainage will not be onsite after reclamation.

7.4.4 Non-Point Source Releases – 19.10.6.603.D.(5)

Non-point source surface releases for acid or other toxic substances shall be contained within the permit area.

As previously discussed, materials excavated from the underground development will be temporarily stored on constructed stockpile areas that will contain stormwater runoff from the stockpiled material and direct it to lined retention ponds. There will be no releases from the Project area.

7.5 Topsoil - 19.10.6.603E (1)-(6)

Where sufficient topsoil is present, the operator shall take measures to preserve it from erosion or contamination and verify that it is in a usable condition for sustaining vegetation when needed.

The following requirements shall be met unless site-specific characteristics mandate different requirements and those requirements are included in the approved permit.

- (1) Topsoil and topdressing shall be sampled and analyzed for vegetation establishment suitability:
 - a. sample spacing and interval shall be based on site-specific materials; and*
 - b. suitability will be identified by analysis based on site-specific materials.**
- (2) If revegetation is a component of the reclamation plan and if sufficient topsoil is present in the disturbed or borrow areas, it shall be collected and preserved to the extent practicable. Sufficient topsoil means that it is of sufficient quality to conform to the definition of topsoil. Any necessary topdressing may be obtained from areas to be disturbed or borrow areas and shall be salvaged separately from other materials as needed, to support its availability for distribution during reclamation.*
- (3) Where direct distribution of topsoil or topdressing is not possible, it shall be stockpiled separately and in a manner to prevent loss of the resource.*
- (4) Topsoil and topdressing shall be distributed in a manner to establish and maintain vegetation, consistent with the approved permit.*
- (5) After distribution, topsoiled and topdressed areas shall be stabilized to protect loss of the resource.*
- (6) Where topsoil has been stockpiled for more than one year, the permittee may be required to conduct analyses to determine if amendments are necessary.*

Topsoil suitability has been evaluated as detailed in Section 6.0 of the BDR (RHR, 2020). Topsoil has been sampled and analyzed for its ability to support vegetation establishment. Ample material has been identified to utilize as topsoil for re-establishing a vegetative community that will support the approved post-mining land use of livestock grazing and wildlife habitat.

The subject of topsoil is discussed in detail, in Section 7.2.1. Where sufficient topsoil is present in the Project area, it will be collected and preserved to the extent practicable. Topsoil may also be obtained from areas to be disturbed and will be salvaged separately from other materials for reclamation purposes.

Where direct distribution of topsoil is not possible, it will be stockpiled separately and in a manner to prevent loss of the resource. Stockpiling and management of stockpile topsoil is addressed in Section 3.2.2 and Section 6.1.9.

Topsoil will be distributed in a manner that supports the establishment and maintenance of vegetation. The distribution and application of topsoil on reclaimed areas is further discussed in

Section 7.2.1. After distribution, areas where topsoil was applied will be stabilized to protect against loss of the resource. The materials will be lightly ripped or disked to prepare a suitable seedbed, and seed will be applied by drilling or broadcast seeding. The seeded areas will then be mulched and stabilized.

Topsoil that has been stockpiled for more than one year will be analyzed prior to use to determine if soil amendments are necessary to support successful reclamation of disturbed areas.

7.6 Erosion Control - 19.10.6.603F

Reclamation of disturbed lands must result in a condition that controls erosion. Revegetated lands must not contribute suspended solids above background levels, or where applicable the Water Quality Control Commission's standards, to streamflow of intermittent and perennial streams. Acceptable practices to control erosion include but are not limited to the following:

- (1) stabilizing disturbed areas through land shaping, berming, or grading to final contour;*
- (2) minimizing reconstructed slope lengths and gradients;*
- (3) diverting runoff;*
- (4) establishing vegetation;*
- (5) regulating channel velocity of water;*
- (6) lining drainage channels with rock, vegetation or other geotechnical materials; and*
- (7) mulching.*

As part of reclamation operations, disturbed areas will be stabilized through grading to conform to the geomorphic character of the region and surrounding area. This includes shaping, berming, and grading to final contour to reduce erosion potential. Reclamation of slopes will incorporate the practice of minimizing slope lengths and gradients, construction of water bars or other methods to further reduce the risk of excessive erosion.

Runoff and run-on will be diverted from reclaimed areas to prevent erosion. Establishment of vegetation is a primary objective of the mine's reclamation operations and is described in detail in Section 7.7. Vegetation will play a key role in stabilizing soils and reducing sediment transport.

To manage surface water flows and reduce erosion, systems will be constructed to regulate channel velocity. These systems, described in Section 3.4, include surface water diversions and stabilization BMPs such as riprap, energy dissipation structures, straw bales, and wattles.

Weed-free mulch will be applied to reseeded areas at a rate of two tons per acre to protect soil surfaces, retain moisture, and support seed germination. This mulching practice will further enhance erosion control and contribute to successful revegetation.

7.7 Revegetation - 19.10.6.603G

Revegetation of areas disturbed by mining operations will be achieved following the practices and procedures outlined in the proposed reclamation plan. Affected areas will be backfilled, regraded and shaped to conform with the geomorphic character of the area before mining operations and of areas surrounding the disturbed areas. Salvaged topsoil will be redistributed over regraded areas and seeded in support of the post-mining land use of livestock grazing.

Temporary drill pads, dewatering well pads, ventilation shaft pads, and temporary access roads will be revegetated using these same reclamation procedures following completion of their

intended use. Where salvaged topsoil is available, it will be redistributed over reclaimed disturbances to provide a suitable growth medium for revegetation. If salvaged topsoil is unavailable or insufficient, other suitable topdressing or growth media may be utilized, where appropriate, to facilitate revegetation consistent with site conditions and the approved reclamation plan.

The proposed seed mix shown in **Table 24** is utilized at the Lee Ranch Coal Mine, which is located in the same region as the Roca Honda Mine and in similar topography, soils and climatic regime. This seed mix has been developed and shown to be effective over the past 30+ years. The seed mix includes a combination of cool and warm-season grasses, forbs, and shrubs that have proven successful in re-establishing vegetation in reclaimed mining facilities. These species are well-suited for wildlife and livestock grazing due to their high palatability and nutritional value. Varied seasonal growth patterns result in year-round forage availability, supporting post-mining grazing by domestic livestock and wildlife.

Revegetation success will be evaluated using the approved reference area(s), the monitoring procedures described in Appendix H, and the applicable performance standards of NMAC 19.10.6.603.G to demonstrate that reclaimed areas are progressing toward stable, self-sustaining native plant communities compatible with the approved post-mining land use, ecological capability, and adjacent National Forest System lands.

Table 25. Proposed Reclamation Seed Mix for the Roca Honda Mine

Common Name	Scientific Name	Variety/Source	Application Rate – PLS lbs/acre (Broadcast)
Cool Season Grasses			
Thickspike Wheatgrass	<i>Agropyron dasystacyum</i>	Critana	2.0
Indian Ricegrass	<i>Achnatherum hymenoides</i>	Nezpar or Paloma	1.0
Western Wheatgrass	<i>Agropyron smithii</i>	Arriba	3.0
Warm Season Grasses			
Blue Grama	<i>Bouteloua gracilis</i>	Hachita or Alma	2.0
Sideoats Grama	<i>Bouteloua curtipendula</i>	Niner or Vaughn	2.0
Galleta	<i>Hilaria jamesii</i>	Viva	3.0
Alkali sacaton	<i>Sporobolus airoides</i>	Native	0.1
Forbs			
Munro Globemallow	<i>Sphaeralcea munroana</i>	Native	0.4
Blue Flax	<i>Linum lewisii</i>	Appar	0.5
Shrubs			
4-Wing Saltbush	<i>Atriplex canescens</i>	Native	3.0
Winterfat	<i>Ceratoides lanata</i>	Native	1.0
Shadscale	<i>Atriplex confertifolia</i>	Native	1.0

Vegetation test plots will be established in accordance with applicable MMD requirements and the approved reclamation plan. The need for additional test plots on National Forest System lands will be determined through coordination with MMD and the U.S. Forest Service. If site-specific

conditions on National Forest System lands are determined to differ sufficiently from those represented by the Section 16 test plots, additional test plots may be established as appropriate. Otherwise, the Section 16 test plots may be used as representative of comparable reclamation conditions.

Reference areas and vegetation test plots will be selected to represent the reclamation objectives and ecological site characteristics of the areas being reclaimed. Although mature piñon-juniper woodland occurs within portions of the Project area, the post-mining reclamation objective is to establish a stable, self-sustaining native plant community consistent with the approved post-mining land use and site capability, rather than to recreate every pre-disturbance vegetation association. Consequently, the selected reference area emphasizes the dominant shrub-grassland and juniper savanna communities that comprise the majority of anticipated disturbance and are consistent with the approved reclamation objectives. Native grasses, forbs, shrubs, and appropriate woody species will continue to be incorporated into the reclamation seed mix and performance evaluation where consistent with site conditions, ecological capability, and the approved post-mining land use. If the U.S. Forest Service and MMD determine that additional reference areas are necessary to represent site-specific ecological conditions on National Forest System lands, additional reference plots will be established through agency coordination and incorporated into the reclamation monitoring program.

7.7.1 NMAC 19.10.6.603.G.(1)-(3)

To obtain the release of financial assurance revegetated lands must meet the following standards:

- (1) Revegetation success for a self-sustaining ecosystem shall be determined through comparison of ground cover, productivity and diversity and shall be made on the basis of the following approved reference areas; through the use of technical guidance procedures published by the U. S. Department of Agriculture; other reasonably attainable standards methods and techniques on reference areas and reclaimed areas.*
 - (a) foliage or basal cover and productivity of living perennial plants of the revegetated area shall be established equal to 90 percent of the reference area or equal to the approved revegetation standard to within a 90-percent statistical confidence;*
 - (b) diversity of plant life forms (woody plants, grasses, forbs) shall consider what is reasonable based on the physical environment of the reclaimed area; and*
 - (c) woody plant species shall be established to the approved density with an 80 percent statistical confidence.*
- (2) For areas for which the approved post-mining land use is for wildlife habitat or forest land, success of vegetation shall be determined on the basis of tree or shrub stocking (density) and ground cover.*
 - (a) The ground cover of living perennial plants shall be equal to 90 percent of the native ground cover of the reference area or the approved standard to within a 90 percent statistical confidence and shall be adequate to control erosion.*
 - (b) Tree stocking for forest land shall have stocking rates of plant species equal to 90 percent of the approved reference area or other approved standard with an 80 percent statistical confidence and shall be adequate to control erosion.*
 - (c) If wildlife habitat is to be the post-mining land use, the operator shall select and use plant species on reclaimed areas based on the following criteria:*
 - (i) their proven nutritional value for fish and wildlife;*

- (ii) their uses as cover and security for wildlife;*
 - (iii) their ability to support and enhance fish and wildlife habitat; and*
 - (iv) distribute plant life forms to maximize benefits of edge effect, cover and other benefits for fish and wildlife.*
- (3) Revegetation for other post-mining land shall be consistent with the approved post-mining land use. Site-specific standards may include standards for foliar or basal cover, production and diversity and will be included in the approved permit.*

Revegetation success for a self-sustaining ecosystem will be determined through comparison of ground cover, productivity, and diversity and will be made on the basis of a reference area located in Section 16, see **Appendix H** for the Proposed Reference Area Report. The revegetation success will also be determined using technical guidance procedures described in MMD's Guidance Document for Part 6 New Mining Operations. Data collection will be performed using the same methods and techniques on reference areas and reclaimed areas. More specifically, the goal of revegetation will be to meet:

- Foliage or basal cover and productivity of plants of the revegetated area to 90% of the reference area or within a 90% statistical confidence;
- Diversity of plant forms (woody plants, grasses, forbs) relative to the physical environment of the area to be reclaimed; and
- Establishment of woody plants to obtain the approved density with an 80% statistical confidence.

The approved post-mining land use for the Project area is livestock grazing. Therefore, revegetation design, species and methods proposed will result in the area being supportive of livestock grazing on a sustainable basis.

Revegetation success will be promoted through progressive reclamation, preservation and redistribution of salvaged topsoil where available, minimization of soil compaction, implementation of erosion and sediment control measures as needed, use of certified weed-free native seed mixes appropriate for the site, and reclamation monitoring in accordance with the approved reclamation plan.

As such, the reclamation objectives will target a higher percentage of grasses and forbs than woody plants. However, woody species such as four-wing saltbush (*Atriplex canescens*) and winterfat (*Ceratoides lanata*), offer good livestock and wildlife forage as well as providing habitat diversity.

7.8 Perpetual Care - 19.10.6.603H

The operation will be designed to meet without perpetual care all applicable environmental requirements of the Act, 19.10 NMAC and other laws following closure.

RHR reclamation was designed to meet, without perpetual care, applicable environmental requirements of the Act, 19.10.6 NMAC and other laws following closure.

8.0 USFS Reclamation Standards

This section supplements the reclamation requirements described above and applies specifically to NFS lands administered by the USFS. Reclamation activities on NFS lands will also be conducted in accordance with the Forest Service Manual 2800, Chapter 2842 performance standards. These standards are complementary to, and not in lieu of, the requirements of the NMMMD.

8.1 Revegetation

A fenced, controlled reference plot will be established within the permit area in a location representative of site conditions (e.g., soil type, slope, and aspect) to serve as a standard for revegetation success. The reference area is located in Section 16, as described in **Appendix H**, and will be coordinated with the USFS for areas on National Forest System lands. The reference plot and reclaimed areas will be seeded with an approved seed mix consisting of native species appropriate for the site, as described in Section 7.7. Revegetated areas will be monitored and compared to the reference plot to evaluate revegetation success. Monitoring, maintenance, and success criteria, including performance standards and corrective actions, are described in Section 7.7 and will be implemented until revegetation success criteria are achieved in accordance with applicable regulatory requirements.

8.2 Soil and Water Conservation

Inspections of storm water erosion controls, evaporation ponds, and the water detention basins will be performed before, during and after a precipitation event and the required maintenance.

Existing livestock wells within and adjacent to the Project area will be monitored, as appropriate, to evaluate potential effects from mining activities. Monitoring approaches and locations will be coordinated with the USFS. If monitoring indicates that Project activities are adversely affecting livestock water supplies, RHR will work with the USFS to identify and implement appropriate mitigation measures, which may include well modification, replacement, or development of alternative water sources, as necessary.

8.3 Mass Stability

The operational stockpiles will be removed during reclamation and the disturbed area will be recontoured to blend with the natural topography.

8.4 Concurrent Reclamation

Concurrent reclamation will be initiated with topsoil stripping and continue through mine operations. This ongoing and/or early reclamation reduces erosion, isolates and protects material for later use, provides mitigation of potential impacts, and reduces the final reclamation work and costs. Adjunct to concurrent reclamation is avoidance of disturbance and the use of existing roads and access corridors whenever possible. RHR will improve some of these existing roads for its needs and locate ventilation holes and escape shafts on old drill pads whenever possible.

Candidate areas for concurrent reclamation include the mud pits and the excavated material stockpiles, consisting of: 1) topsoil, 2) subsoil, 3) sub-base rock, 4) shaft material, 5) non-ore material, and 6) ore-bearing material.

Hole abandonment and reclamation procedures will begin immediately following geophysical logging of each drill hole. Hole abandonment and reclamation procedures will be conducted in accordance with the methods described in Section 6.1.3.

Disturbed areas at the drill site will then be reclaimed by broadcasting an approved seed mixture over the areas and harrowing or mulching to cover the seed during the first favorable season. Any large shrubs or trees removed during pad preparation will be cut into small pieces and scattered over the reclaimed drill site. Unless on-going access to the site or location is needed, the two-track trail or road to the site will also be reclaimed as described in Section 6.1.8.

Prior to disturbance, topsoil will be salvaged and stockpiled for reuse during reclamation. Drill pads and temporary access routes will be regraded to approximate pre-disturbance contours and de-compacted as necessary prior to redistribution of salvaged topsoil. Revegetation will be conducted using the approved native seed mix described in Section 7.7. Additional measures, such as mulching, use of salvaged woody material, and other soil stabilization techniques, may be implemented as necessary to support revegetation success. Monitoring and maintenance of reclaimed drill sites will be conducted in accordance with the procedures and success criteria described in Section 7.7.

8.5 Post-Mining Land Configuration

The post-mining re-contouring is provided in **Figures 35 through 37**.

RHR has provided a Preliminary Reclamation Cost Estimate in **Appendix G** to this submittal. MMD regulations and guidelines refer to the applicant submitting a Financial Assurance proposal after Permit Application Package (PAP) has been deemed “approvable”. A detailed reclamation cost estimate will accompany RHR’s Financial Assurance proposal to MMD once the PAP has been deemed “approvable”. Should it be decided a Reclamation Performance Bond is necessary for this Project, RHR will furnish the MMD Financial Assurance proposal along with an updated Reclamation Performance Bond and the bond calculation worksheet as an addendum to this Plan of Operations.

9.0 Compliance with Other Applicable Laws

- (A) Enforcement of other state or federal laws, regulations or standards shall be conducted by the agency charged with the responsibility under the applicable state or federal law, regulation or standard.*
- (B) Enforcement of non-point source surface releases of acids or other toxic substances shall be performed by the Environment Department.*
- (C) During the term of a permit issued pursuant to 19.10 NMAC, the permittee must maintain environmental permits required for the permit area. Revocation or termination of such a permit or the forfeiture of financial assurance related to the permit area by another governmental agency is adequate ground for the Director to issue a cessation order pursuant to 19.10.11 NMAC.*

The Project is proposed and will be conducted in accordance with applicable federal, state, and local laws, regulations, and policies governing mining operations on National Forest System lands. Mining activities are authorized under federal statutes including the General Mining Act of 1872, the Multiple-Use Mining Act of 1955, and the Mining and Minerals Policy Act of 1970, which collectively support the orderly and responsible development of mineral resources while ensuring consideration of environmental and land management objectives.

The Project will be reviewed and administered by the U.S. Forest Service in accordance with Forest Service mining regulations at 36 C.F.R. Part 228, Subpart A, and will be consistent with the National Forest Management Act and its implementing regulations at 36 C.F.R. Part 219. Approval of the Plan of Operations will be based on the standard set forth in 36 C.F.R. § 228.5, which requires that operations be conducted so as to minimize adverse environmental impacts on National Forest System surface resources, where feasible.

The Mine Operations and Reclamation Plan (MORP) was developed to meet this standard through incorporation of site-specific design measures, operational controls, monitoring programs, and reclamation practices intended to avoid, minimize, and mitigate impacts to surface resources. The Project will also comply with other applicable environmental and resource protection requirements, including those related to water quality, air quality, cultural resources, biological resources, and reclamation.

Environmental review of the Project will be conducted in accordance with the National Environmental Policy Act (NEPA) and applicable implementing regulations. Cultural resource compliance will be completed pursuant to Section 106 of the National Historic Preservation Act, in coordination with the U.S. Forest Service, State Historic Preservation Office, Tribes, and other consulting parties. A Memorandum of Agreement (MOA) will be developed and finalized as part of the Section 106 process and will serve as the primary mechanism for documenting agreed-upon mitigation measures and commitments, which will be incorporated into Project implementation.

This PoO-MORP provides the technical and operational framework for the proposed mining activities and is intended to support agency review, environmental analysis, and decision-making consistent with applicable regulatory requirements and land management objectives. **Table 25** contains a list of other regulatory agency approvals that will be needed for the Project.

Table 26. List of Federal and State Permits

Permit Approval	Granting Agency
Federal	
NPDES Discharge Permit	U.S. Environmental Protection Agency (EPA)
U.S. COE 404 Permit	If needed, U.S. Army Corps of Engineers (ACOE)
NPDES Construction Stormwater Permits	EPA
NPDES Stormwater Discharge Permit	EPA
NESHAP – Emissions Modeling	EPA
Approved Plan of Operations for Mine	US Forest Service (USFS)
ROW for electrical power line; depending on existing ROW; possible special use permit	USFS
Standard Form 299 – Discharge pipeline right-of-way crossing BLM land	Bureau of Land Management (BLM)
Radioactive material license for ion exchange	NRC for mine water treatment if > 0.05 % uranium by weight*
Blasting License	Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF)
Mine Registration	Mine Safety and Health Administration (MSHA)
State	
Mine registration (Form 1)	New Mexico Energy, Minerals and Natural Resources Dept., Mining and Minerals Division
Construction and Operations Permits (Air)	New Mexico Environment Dept., Environmental Protection Division, Air Quality Bureau
Petroleum Storage Tanks Registration Form	New Mexico Environment Dept., Environmental Protection Division, Air Quality Bureau, Petroleum Storage Tank Bureau
Section 401 Certification (as applicable)	New Mexico Environment Dept., Environmental Protection Division, Water Quality Bureau
Permit to Appropriate Underground Waters of the State of NM	Office of the State Engineer, Water Resource Allocation Program
Mine Dewatering Permit	Office of the State Engineer, Water Resource Allocation Program
Mine Discharge Permit	New Mexico Environment Department, Ground Water Quality Bureau
Closure Plan for retention ponds	New Mexico Environment Department, Ground Water Quality Bureau
Liquid (Septic) Waste Permit or Registration	New Mexico Environment Dept., Environmental Protection Division, Solid Waste Bureau
Building Permit	New Mexico Regulation and Licensing Dept., Construction Industries Division
Non-Subdivision Road Work Request	New Mexico Dept. of Transportation through McKinley County office
State Highway Access Permit	New Mexico State Highway and Transportation Dept
Radioactive material license RCB Form 016 (possibly for source used for onsite analysis)	New Mexico Environment Dept., Field Operations Division, Radiation Control Bureau

*If necessary, RHR will obtain and maintain any radioactive material license or other authorization required for the final WTP treatment process, including management and disposition of ion-exchange resin or other materials that are subject to applicable radioactive-material licensing requirements.

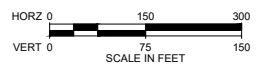
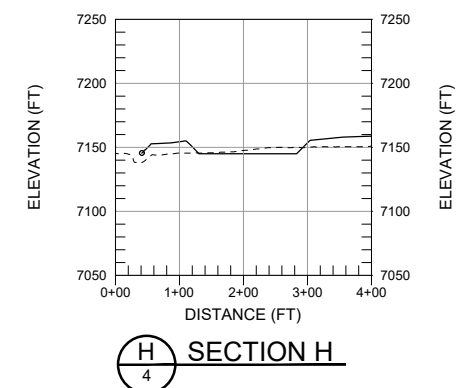
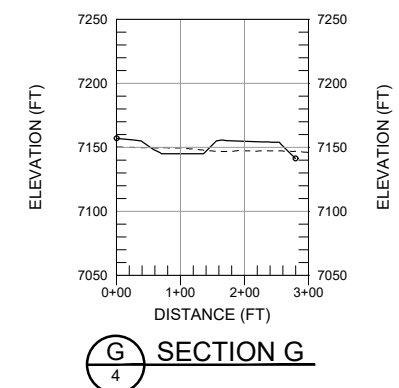
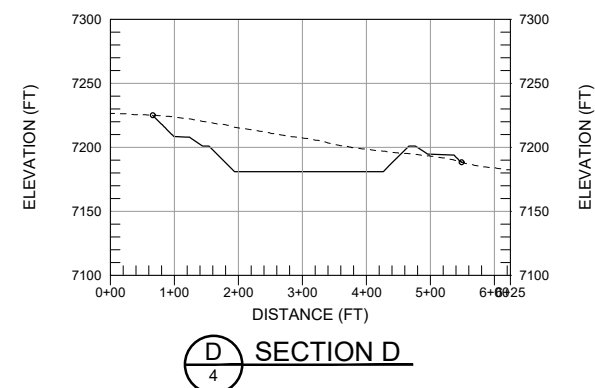
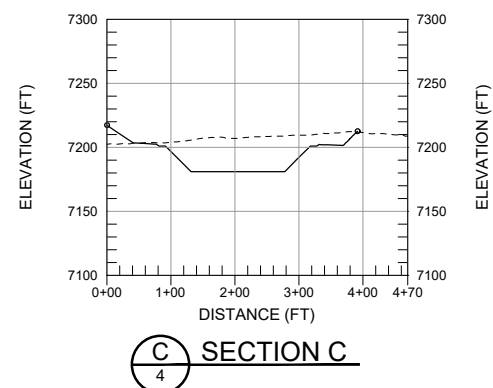
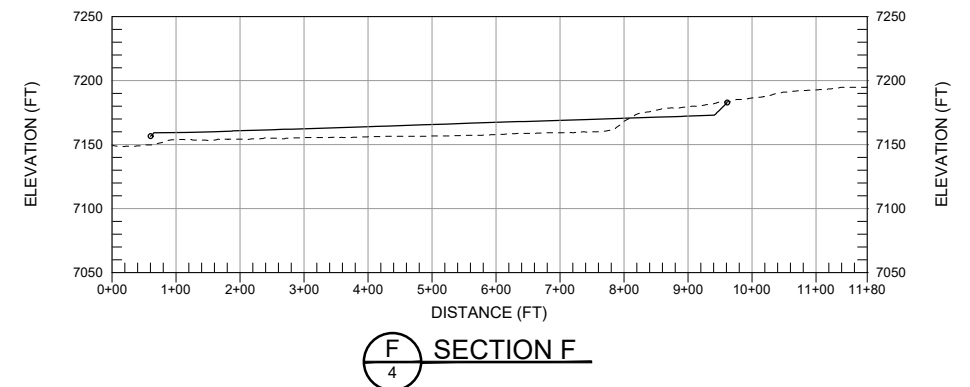
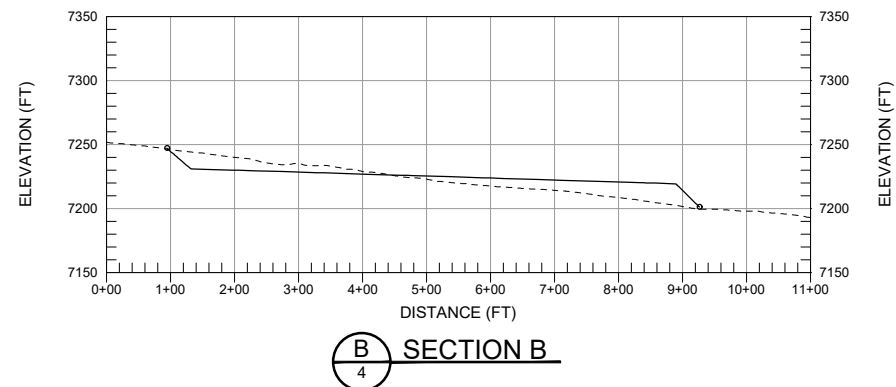
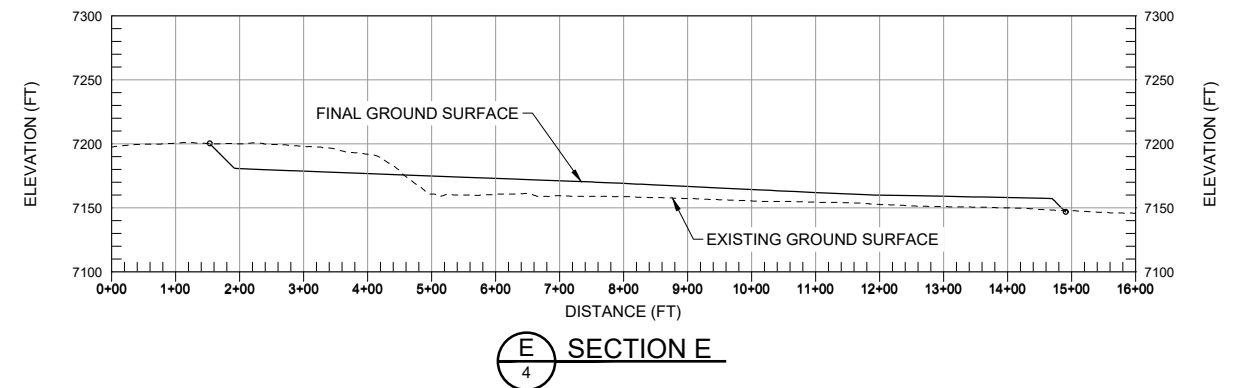
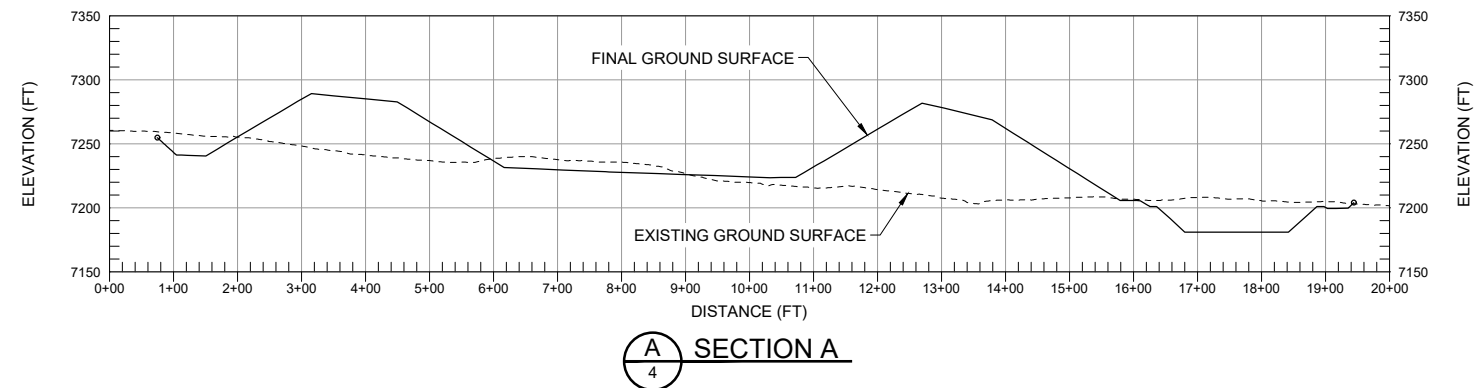
The licensing determination will be documented through applicable regulatory correspondence and incorporated into the final WTP design and residual-management plan.

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Appendix A Preliminary Design Drawings



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Permit-Seal



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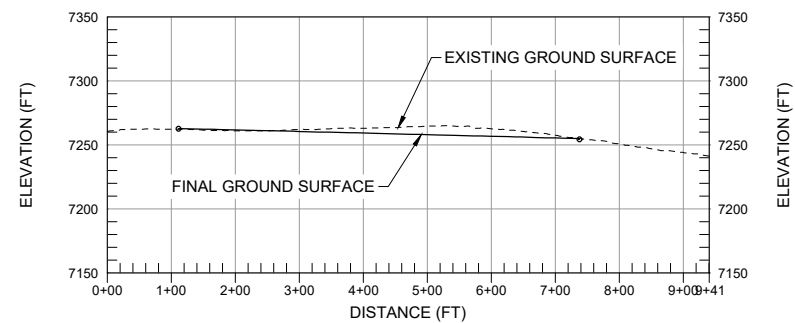


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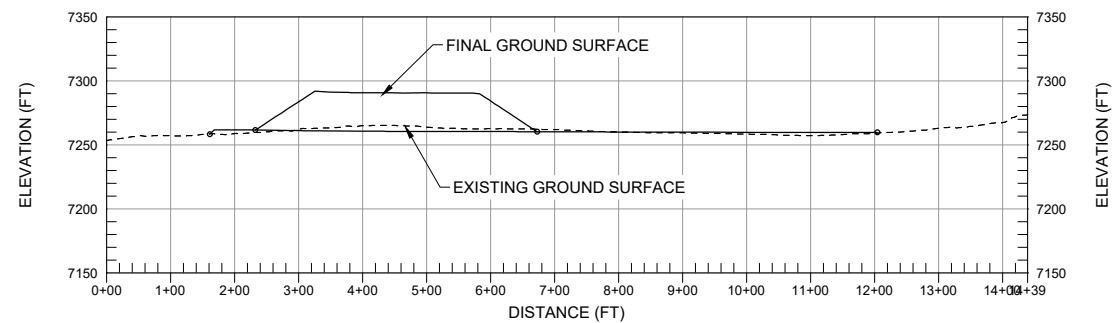
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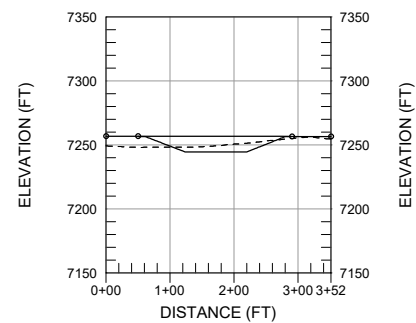
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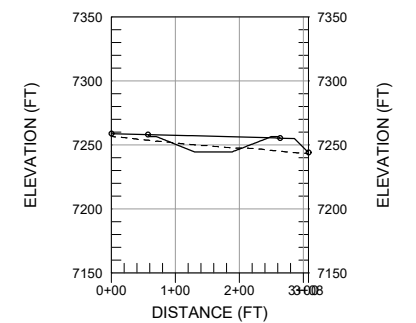
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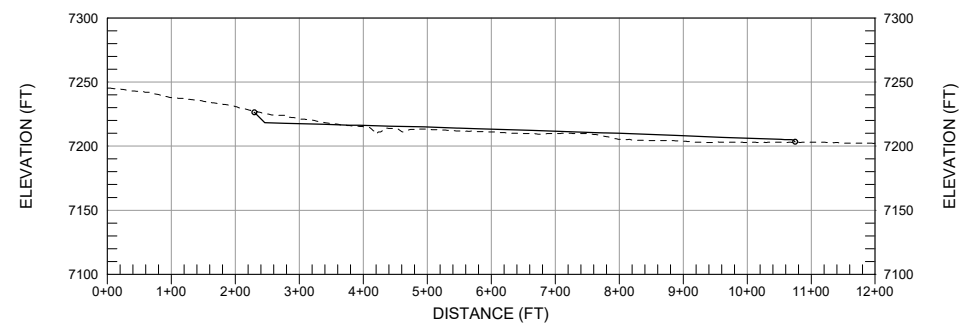
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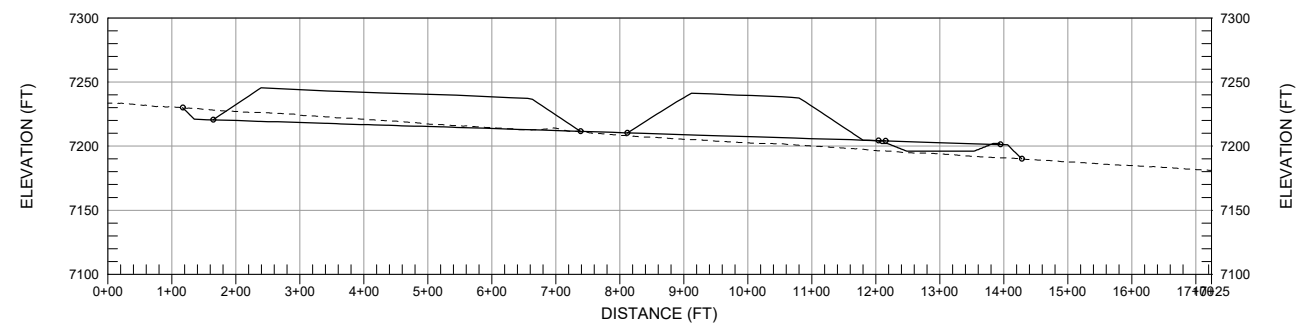
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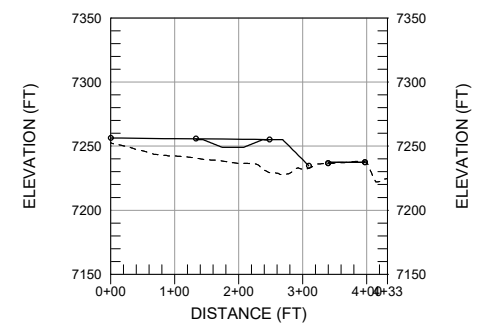
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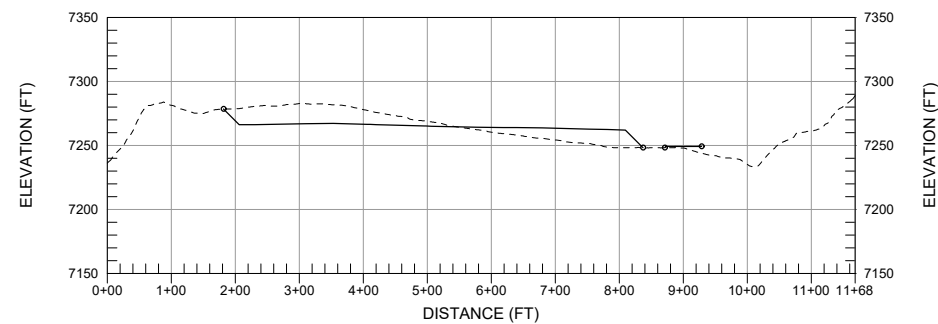
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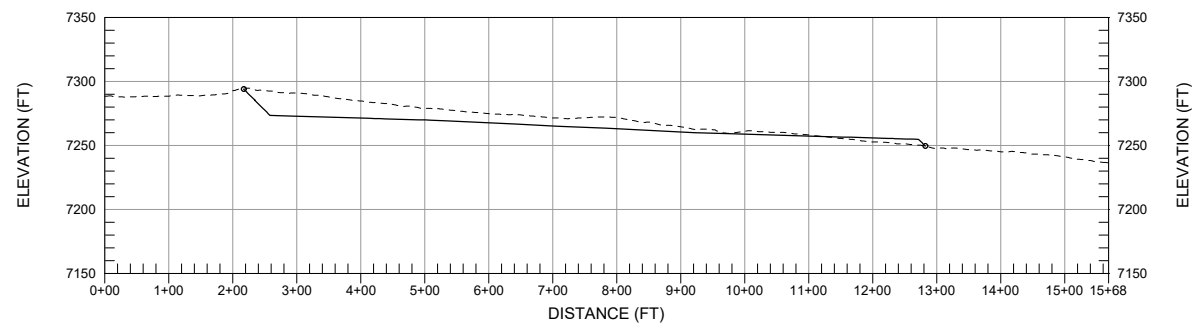
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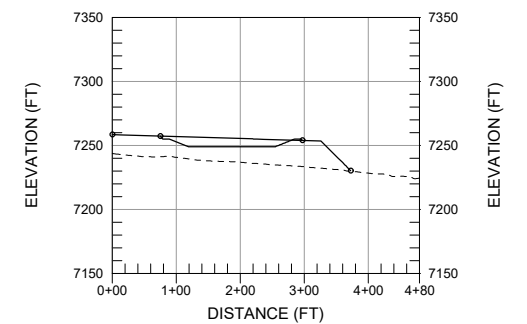
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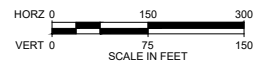
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ROCA HONDA MINE



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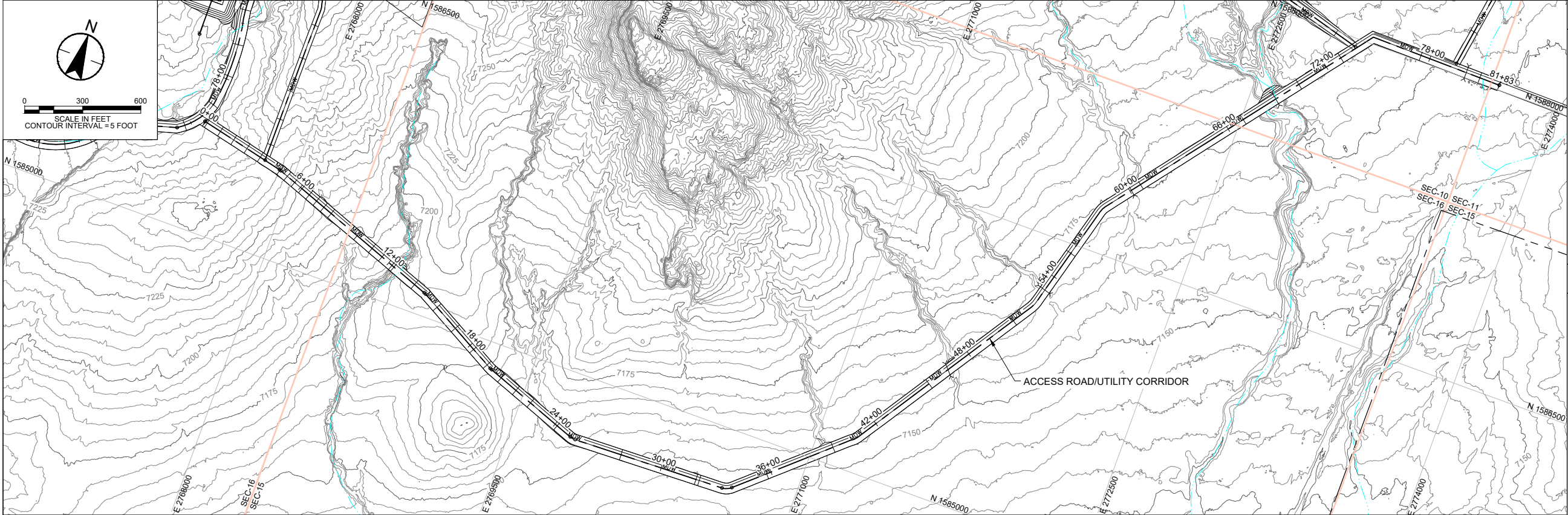
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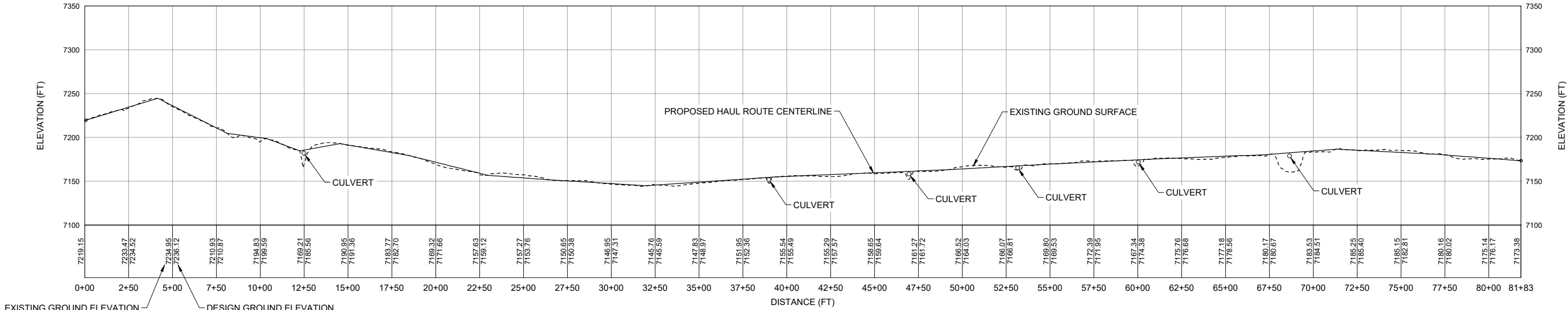
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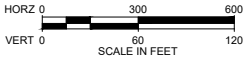
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 - — — SECTION LINES
 - — — EXISTING ROAD
 - - - PERMIT BOUNDARY
 - MDW — DEWATERING PIPELINE
 - — — NATURAL DRAINAGE ARROYO
 - — — CULVERT
 - DEWATERING WELL
 - ⊠ VENT SHAFT

- NOTES:**
- COORDINATE SYSTEM REFERENCE: NAD 83 (NSRS 2011) NEW MEXICO STATE PLANE, WEST ZONE, US FOOT.

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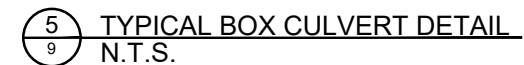
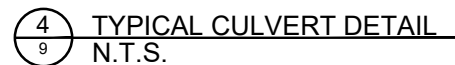
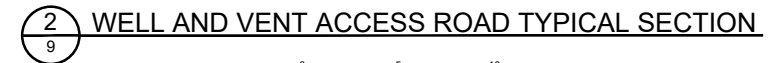
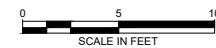
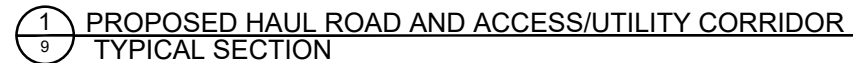
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Appendix B Preliminary Surface Water Management Plan

Roca Honda Mine – Preliminary Surface Water Management Plan



Prepared for:
Roca Honda Resources, LLC

May 8, 2026

Prepared by:
Stantec

Project/File:
Project Number: 182925615

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Roca Honda Mine – Preliminary Surface Water Management Plan

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 - A.2.2 Topographic Data
 - A.2.3 Rain-on-Grid Hyetograph
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Attachment B - Supporting Calculations

1 Introduction

The Roca Honda Mine Project (the site, see Figure 1) is located near San Mateo in McKinley County, New Mexico, approximately 1 mile north from Highway 605. The project is wholly owned by Roca Honda Resources, LLC (RHR), a subsidiary of Energy Fuels Resources Inc. (Energy Fuels). Stantec Consulting Service Inc. (Stantec) has been contracted to provide an update to their Plan of Operations and Mine Operations and Reclamation Plan (PoO-MORP) for the site. RHR is seeking to move most of the proposed surface infrastructure from section 16 into section 17 causing significant changes to the existing PoO-MORP. As part of that work, Stantec has been asked to relocate the facilities and evaluate the existing hydrological conditions and develop a preliminary surface water management plan for the proposed site facilities. Other elements of the proposed site development are detailed in the main report text and supporting appendices.

The objective of this report is to analyze the proposed Roca Honda site development plan for potential stormwater related constraints and develop a preliminary surface water management plan for the project. Development of the preliminary surface water management plan is based on combined hydrologic/hydraulic modeling which characterizes flooding in the project area. These results were used to prepare the initial site layouts and identify and locate the necessary features of the surface water management plan. Preliminary design of the features is developed, and the hydraulic model simulates flood routing for the proposed conditions terrain. This report provides details of the analysis, management plan, and recommendations for next steps to advance the design.

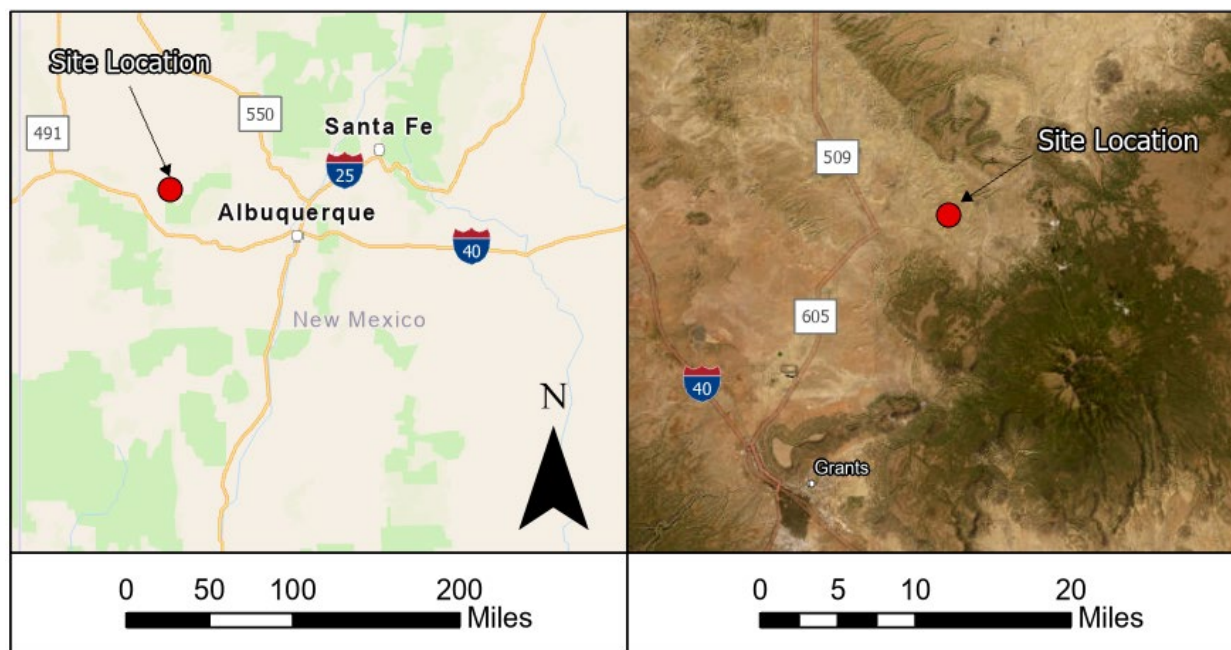


Figure 1: Project Site Location Map

1.1 Hydrological Setting

The Site is located in the high desert region of the American Southwest along the western edge of the Rio Grande Rift. The hydrologic setting of the project area is shaped by its arid to semi-arid climate, volcanic geology, and proximity to the Grants Mineral Belt. The area experiences low annual precipitation, typically between 10 to 15 inches. The precipitation pattern is bimodal, with most precipitation occurring during summer monsoons and occasional winter storms. There are no major perennial streams or rivers adjacent to the project area. Surface water is mainly limited to ephemeral washes and arroyos that flow during intense rainfall events. Runoff is generally low due to relatively high soil infiltration rates. The region depends heavily on groundwater for domestic, agricultural, and limited industrial use.

The project area is located north of San Mateo Creek which is tributary to the Rio San Jose and eventually the Rio Puerco further downstream. Topography in the vicinity of the site generally drains north to south. The San Mateo Mesa north (upstream) of the site defines the watershed boundary between the San Mateo Creek basin and the Canada la Vacas basin to the north. Several ephemeral washes are evident throughout the region below the San Mateo Mesa, illustrating significant runoff can occur and produce erosive environments in the project area. There are no active flow gages on San Mateo Creek. Two United States Geological Survey (USGS) operated stream gages located in Grants collect data for the Rio San Jose (Station ID 08343000) and Grants Canyon Creek (Station ID 08343100). Data for both gages typically show no discharge (i.e., no significant baseflow exists), illustrating the intermittent nature of the creeks and rivers throughout the area. There are no known reservoirs or large impoundments of surface water upstream of the site. Bluewater Reservoir, located approximately 25 miles southwest and downstream of the site, is the only substantial impoundment of surface water in the area and retains approximately 38,500 acre-ft of water.

1.2 Design Criteria

The design criteria considered in this evaluation are preliminary in nature and should be refined in future work scopes. The criteria/objectives listed below were considered during the development of the preliminary surface water management plan:

- Contact water (i.e., runoff from mine-impacted areas and facilities) and non-contact water (i.e., runoff from native ground not impacted by mining) should, to the extent possible, be separated through the use of stormwater management controls (e.g., diversion channels, berms, etc).
- Contact water generating from mining facilities shall be retained in ponds and treated before it is discharged offsite. These retention ponds should provide adequate volume of the 100-year 24-hour storm (2.43 inches) and include additional volume for sediment eroded from each facility or “pad”. For the purposes of this evaluation, Stantec provided additional volume for one year of eroded sediment for each pad.
- Road crossings of significant washes will require culverts in order to maintain access to site facilities during frequent flow events. Preliminary sizing of culverts considered passing the peak discharge from the 100-year 24-hour storm event without overtopping the roadway.

- Facilities will be located, to the extent possible, outside of zones with significant flood hazards, however, other considerations (such as existing archeological sites) are also accounted for in facility siting. Where flood zones are not entirely avoidable, mitigations (e.g., diversion channels, berms, etc.) shall be proposed.

2 Data Sources

Evaluations supporting the development of the surface water management plan rely on publicly available datasets from several sources. The sources and relevant information for each dataset are discussed in the following subsections.

2.1 Topographic Data

Topographic data used for the evaluations described herein was downloaded from the United States Geological Survey's (USGS) National Map website (USGS, 2025), which provides access to publicly available topography survey data. Light detection and ranging (LiDAR) survey collected between 2016 and 2017 and produced through USGS's 3D Elevation Program (3DEP) with a 1-meter horizontal resolution was downloaded and used to represent existing topographic conditions on site. This LiDAR data is shown below in Figure 2.

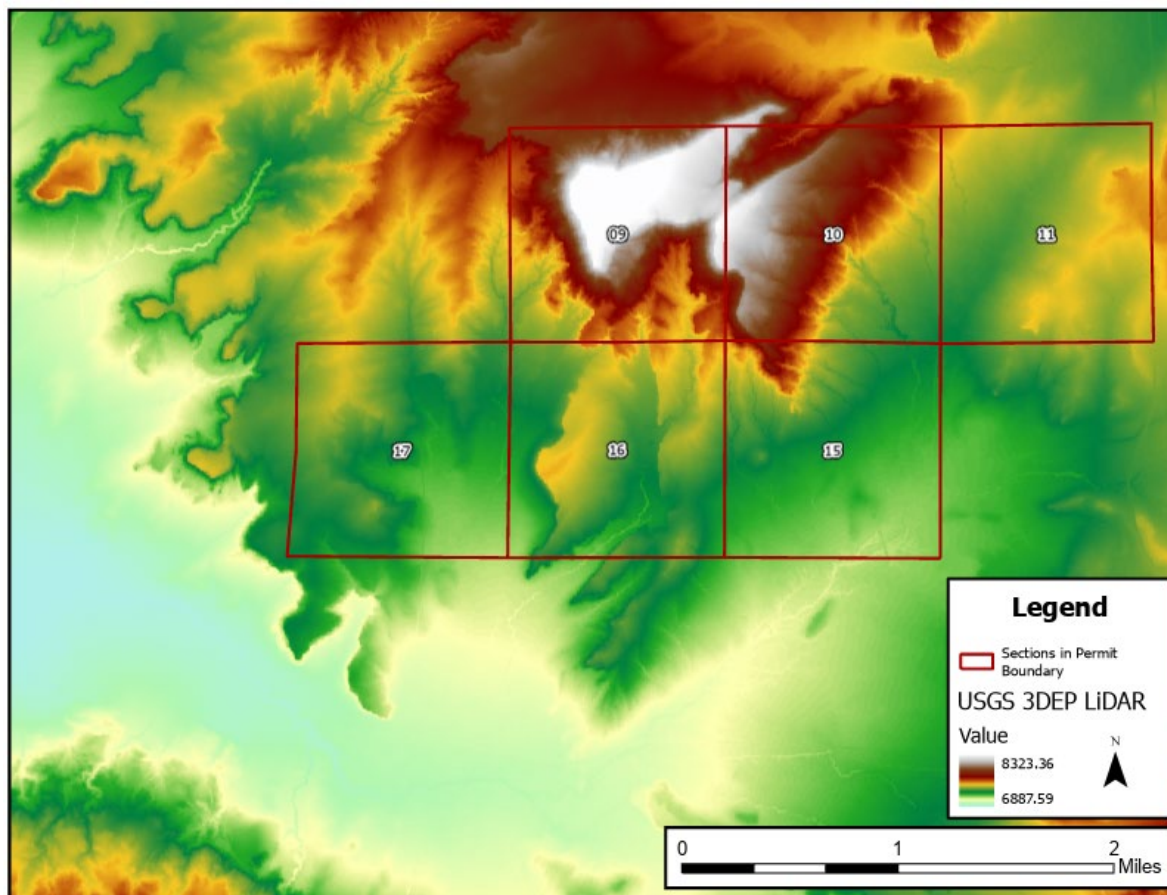


Figure 2: USGS Topographic Data

2.2 Soil Data

Soil data used to characterize the project area was downloaded from the Natural Resources Conservation Service’s (NRCS) web soil survey website (NRCS, 2025). This website provides access to the soil survey geographic database (SSURGO), which contains information about soil as collected by the National Cooperative Soil Survey over the course of a century. The SSURGO database provides estimates of several properties for each soil complex, such as soil texture, hydraulic conductivity, and hydrologic soil group. Soil data available, illustrated by Map Unit Symbol (MUSYM), in the project area is shown in Figure 3. As shown in Figure 3, the SSURGO database is missing data within Sections 9 and 10. Missing data from the SSURGO database was filled in with data available from the Terrestrial Ecological Unit Inventory (TEUI) project (U.S. Forest Service, 2026). The Hydrologic Soil Group for the TEUI data was determined based on the predominant soil texture (based on soil class with highest percentage) and the guidelines from Appendix A of the Natural Resources Conservation Service (NRCS) publication Urban Hydrology for Small Watersheds: Technical Release 55 (NRCS, Urban Hydrology for Small Watersheds, 1986) (see Table 1). Figure 4 illustrates the predominant texture in the TEUI database and Table 2 provides the assumed HSG for each soil texture used for the analysis.

Roca Honda Mine – Preliminary Surface Water Management Plan

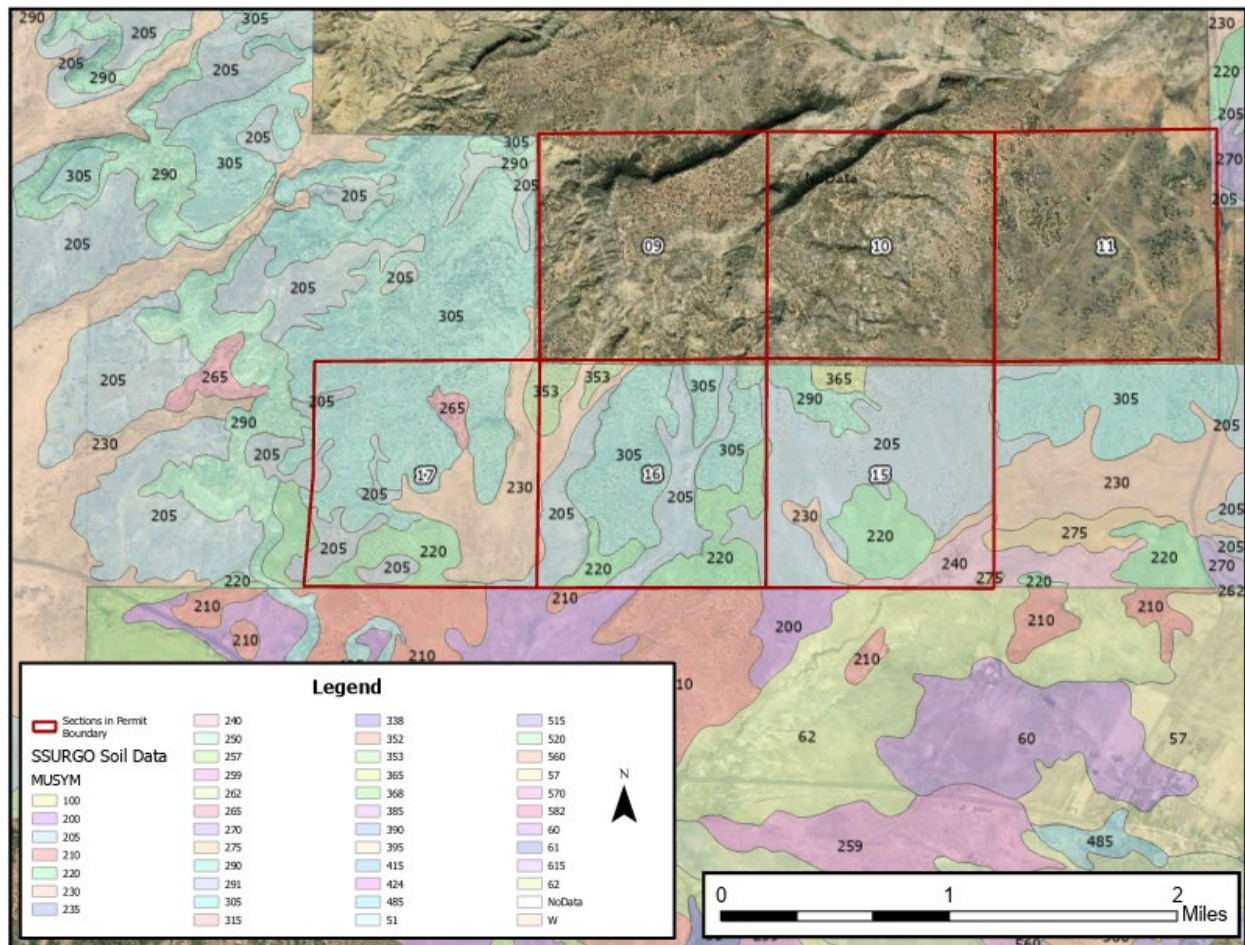


Figure 3: Web Soil Survey SSURGO Data

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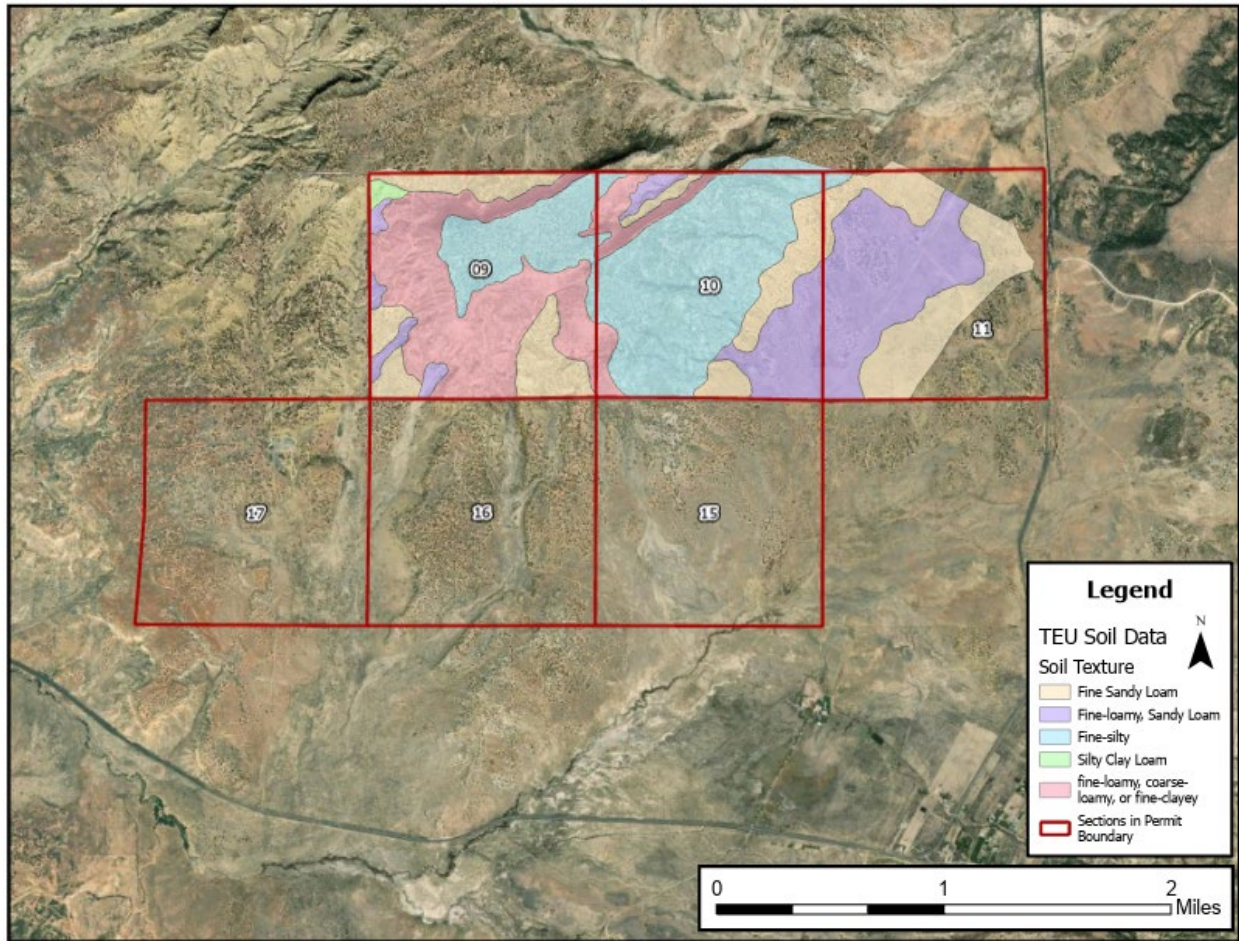


Figure 4: TEU Soil Data (Predominant Soil Texture) (reference)

Table 1: NOAA HSG table based on soil texture (add reference)

Hydrologic Soil	Soil Texture	Soil Group Characteristics
A	Sand, loamy sand, or sandy loam	Soils having high infiltration rates, even when thoroughly wetted and consisting chiefly of deep, well-to-excessively drained sands or gravels. These soils have a high rate of water transmission.
B	Silt loam or loam	Soils having moderate infiltration rates when thoroughly wetted and consisting chiefly of moderately deep to deep, and moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission

Hydrologic Soil	Soil Texture	Soil Group Characteristics
C	Sandy clay loam	Soils having slow infiltration rates when thoroughly wetted and consisting chiefly of soils with a layer that impedes downward movement of water, or soils with moderately fine to fine texture. These soils have a slow rate of water transmission.
D	Clay loam, silty clay loam, sandy clay, silty clay, or clay	Soils having very slow infiltration rates when thoroughly wetted and consisting chiefly of clay soils with a high swelling potential, soils with a permanent high-water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very slow rate of water transmission.

(NRCS, Urban Hydrology for Small Watersheds, 1986)

Table 2: HSG for Various Soil Textures

Soil Texture	HSG
Fine-loamy, Sandy Loam	B
Fine-silty	B
fine-loamy, coarse-loamy, or fine-clayey	C
Silty Clay Loam	D
Fine Sandy Loam	B
Fine-loamy, Sandy Loam	B

2.3 Land Cover

Land cover data within the project area was characterized using survey from the National Land Cover Database (NLCD), available for download online at USGS's EarthExplorer website. The NLCD survey is updated regularly, with the most recent survey available for download being from 2023. Figure 5 shows the 2023 NLCD land cover delineations, where each color and number correspond to a land cover type. Land cover in the project area is dominated by type 52, corresponding to shrub/scrub with the following description "dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage or trees stunted from environmental conditions".

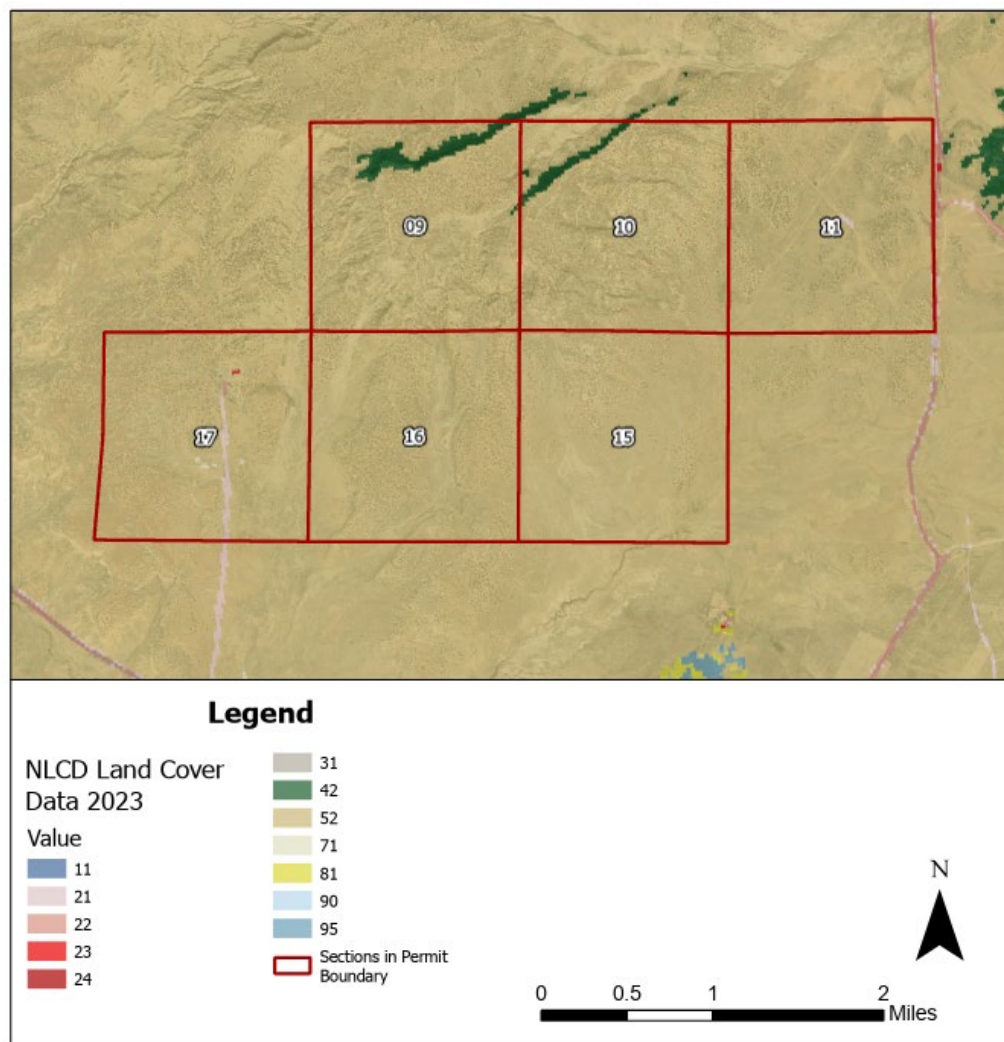


Figure 5: Land Cover Data

2.4 Rainfall Data

Stantec characterized extreme precipitation in the project area using information from the National Oceanic and Atmospheric Administration's (NOAA) Precipitation Frequency Data Server (PFDS) website (NOAA, 2025). Rainfall data was sourced for an annual maximum time series using the point at latitude/longitude 35.3476° N/ 107.6936° W. The median precipitation-frequency estimates for durations up to 24-hours and return intervals up to 100-years obtained from NOAA Atlas 14, Volume 1, Version 5 are provided in Table 1, Volume 1 below. The median precipitation depth estimates for the 100-, 25-, and 5-year 24-hour rainfall events (bolded in the table below) are 1.39, 1.95 and 2.43 inches respectively. NOAA Atlas 14 Volume 1 used rainfall data spanning from 1893 to 2000 and may not capture some of the most recent effects of climate change having occurred over the past ~25 years. For comparison with a more recent study using data up to 2018, Stantec reviewed point precipitation frequency estimates made in the Colorado-New Mexico

Regional Extreme Precipitation Study (CO-NM REPS) (MetStat, Inc. et. al, 2019) at the same latitude/longitude. The 24-hour depths for the 10- and 100-year 24-hour storms from the CO-NM REPS are 1.54 and 2.30, respectively. Because the focus of this study is on more extreme events (100-year return interval), Stantec considered the NOAA estimates fit for use based on reasonable agreement with the 100-year 24-hour depth from CO-NM REPS, which uses more recent climate data and prediction methodologies.

Table 3: NOAA Atlas 14 PFDS Precipitation Depths (inches)

Duration (minutes)	Return Interval (years)					
	2	5	10	25	50	100
5	0.201	0.292	0.352	0.435	0.496	0.563
10	0.305	0.443	0.536	0.662	0.755	0.857
15	0.379	0.55	0.664	0.82	0.936	1.06
30	0.51	0.74	0.895	1.1	1.26	1.43
60	0.632	0.916	1.11	1.37	1.56	1.77
120	0.705	1.01	1.22	1.5	1.72	1.97
180	0.728	1.02	1.23	1.52	1.74	1.98
360	0.803	1.11	1.32	1.6	1.81	2.05
720	0.9	1.23	1.45	1.74	1.95	2.18
1440	1.03	1.39	1.64	1.95	2.18	2.43

3 Surface Water Management Plan

3.1 Existing Conditions Flood Model

Stantec characterized the existing conditions hydrology and flooding extents within the project area using a 2-dimensional (2D) combined hydrologic/hydraulic model using the United States Army Corps of Engineers (USACE) HEC-RAS modeling software. This model simulated the rainfall-runoff response of the project area under the 100-, 25-, and 5-year 24-hour storms to provide a quantitative estimate of runoff rates and delineation of areas prone to flooding during extreme storm events. The main text focuses on the 100-year flood; results for other events, alongside details on the development of the model, are provided in Attachment A.

Figure 6 and Figure 7 provides a summary of the simulated flow depths and velocities within the project area. Using these results, Stantec characterized the flood hazards in the area using hazard definitions outlined by the United States Bureau of Reclamation (USBR, 1988) and shown in Figure 8. Resulting hazard zones are shown in Figure 9. Results of the model (flow depths/velocities, inundation extent, hazard classifications) were used during development of the site layout plan where Stantec attempted, to the extent possible, to avoid areas with potential for flood related hazards.

Roca Honda Mine – Preliminary Surface Water Management Plan

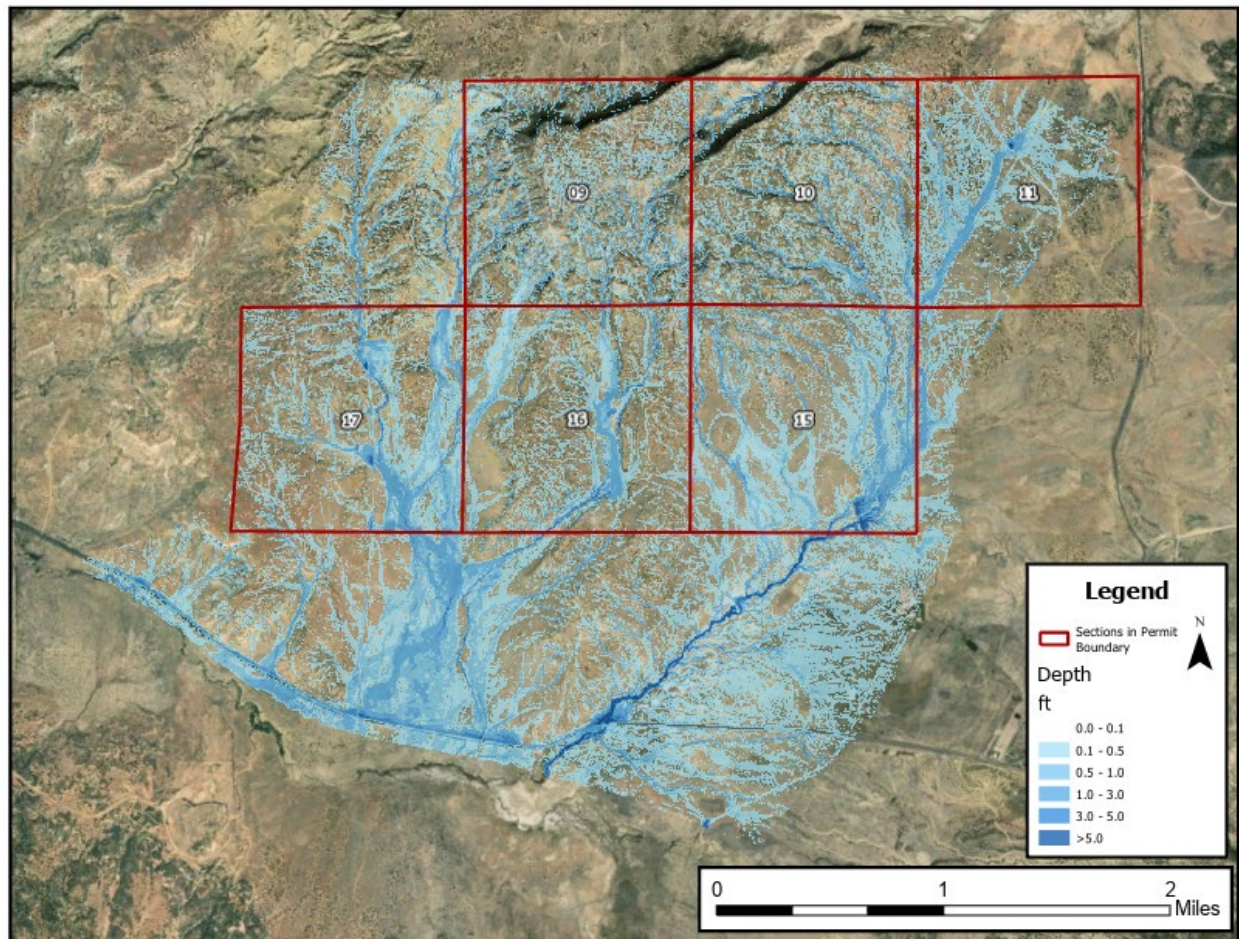


Figure 6: Flow Depth 100-yr Results Within the Project Area

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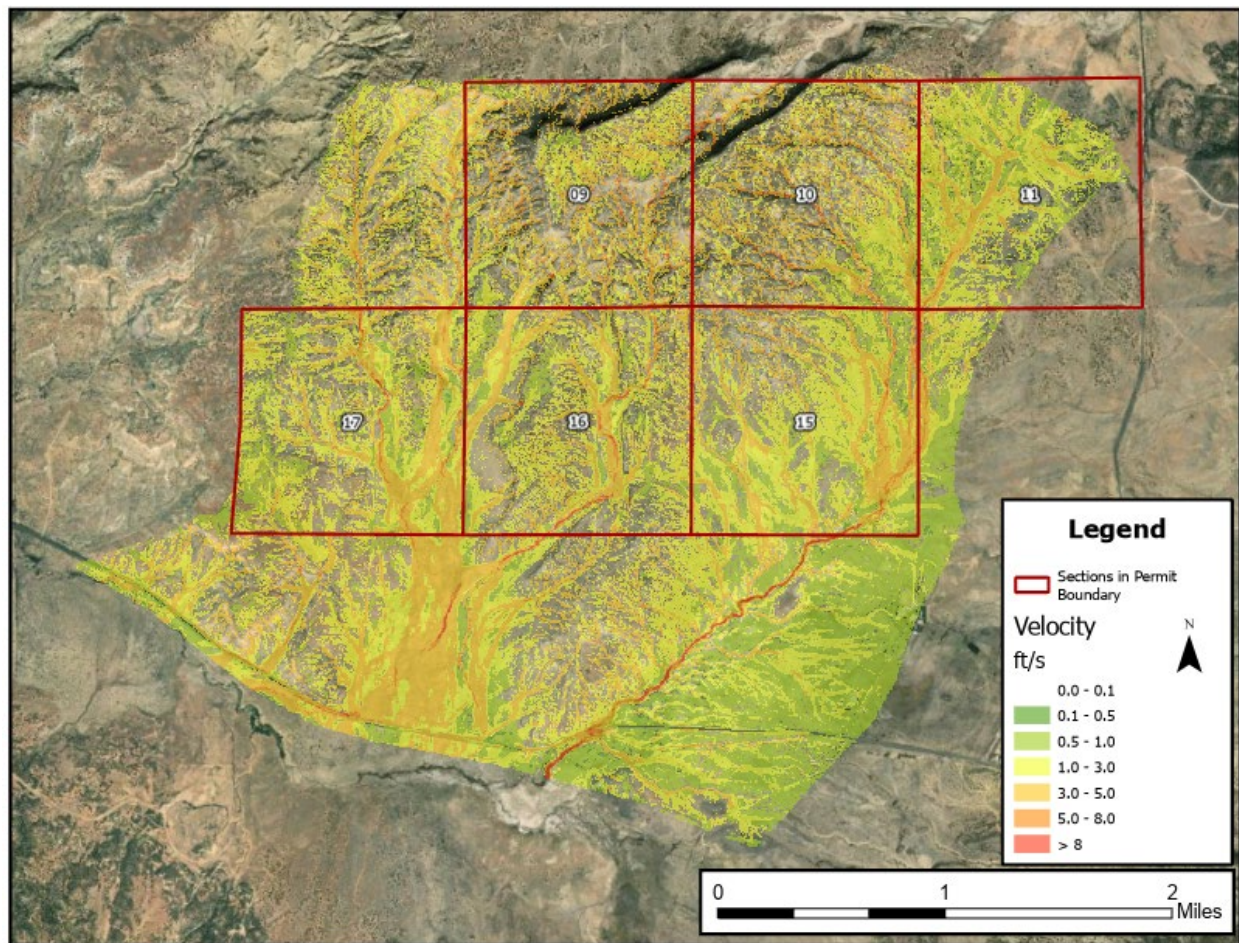


Figure 7: Velocity 100-yr Results Within the Project Area

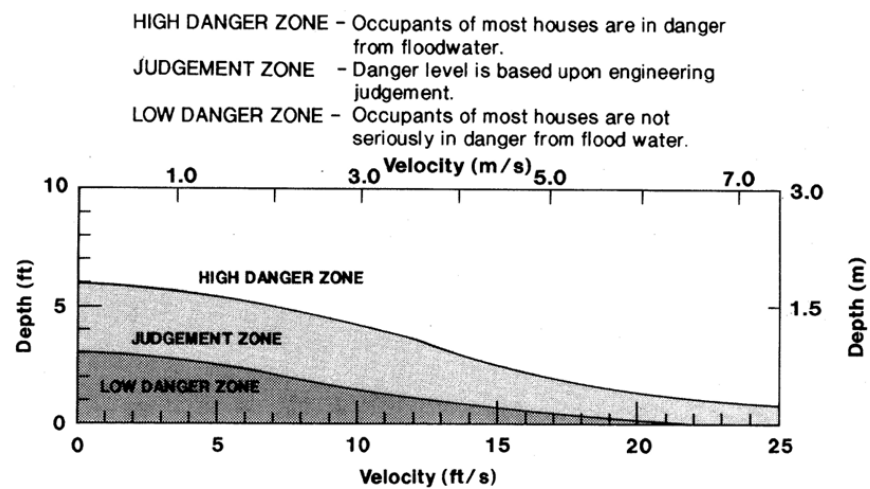


Figure 8: USBR Flood Hazard Definitions (USBR, 1988)

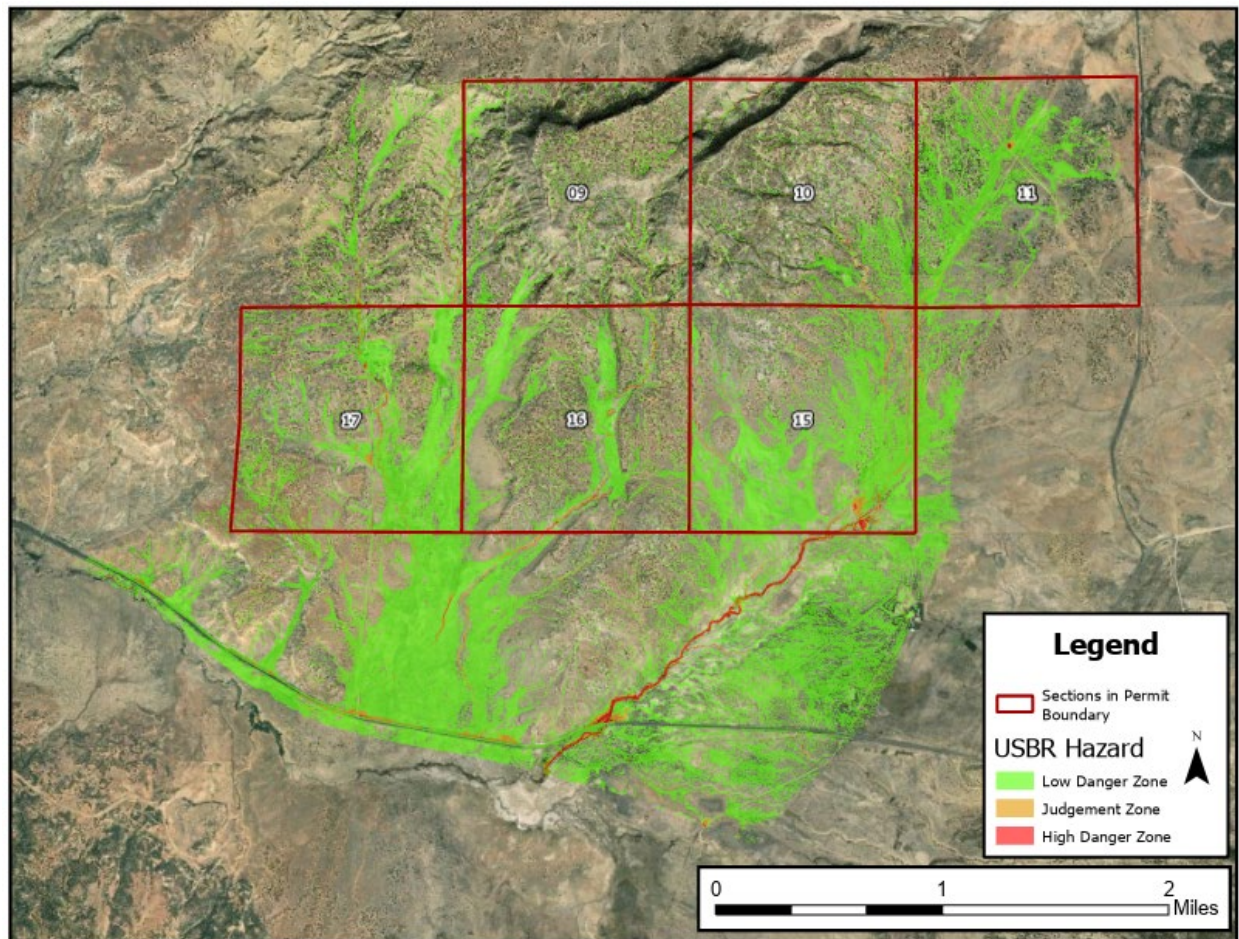


Figure 9: USBR Hazard Map within the Project Area

Most areas showing hazards in the high or judgement zones are within the ephemeral washes or at the crossings with existing roadways.

3.2 Surface Water Management Plan

Following the siting of the mine-related facilities, Stantec identified several constraints related to flooding adjacent to proposed facilities and developed a preliminary surface water management plan to meet the objectives described in Section 1.2. The preliminary site layout plans developed using the model's results are shown in Figure 10, Figure 11 and Figure 12. The associated constraints and mitigations proposed in the surface water management plan are described in Table 4. Additional details on the mitigations are provided in the following subsections. Supporting calculations are provided in Attachment B.

Roca Honda Mine – Preliminary Surface Water Management Plan

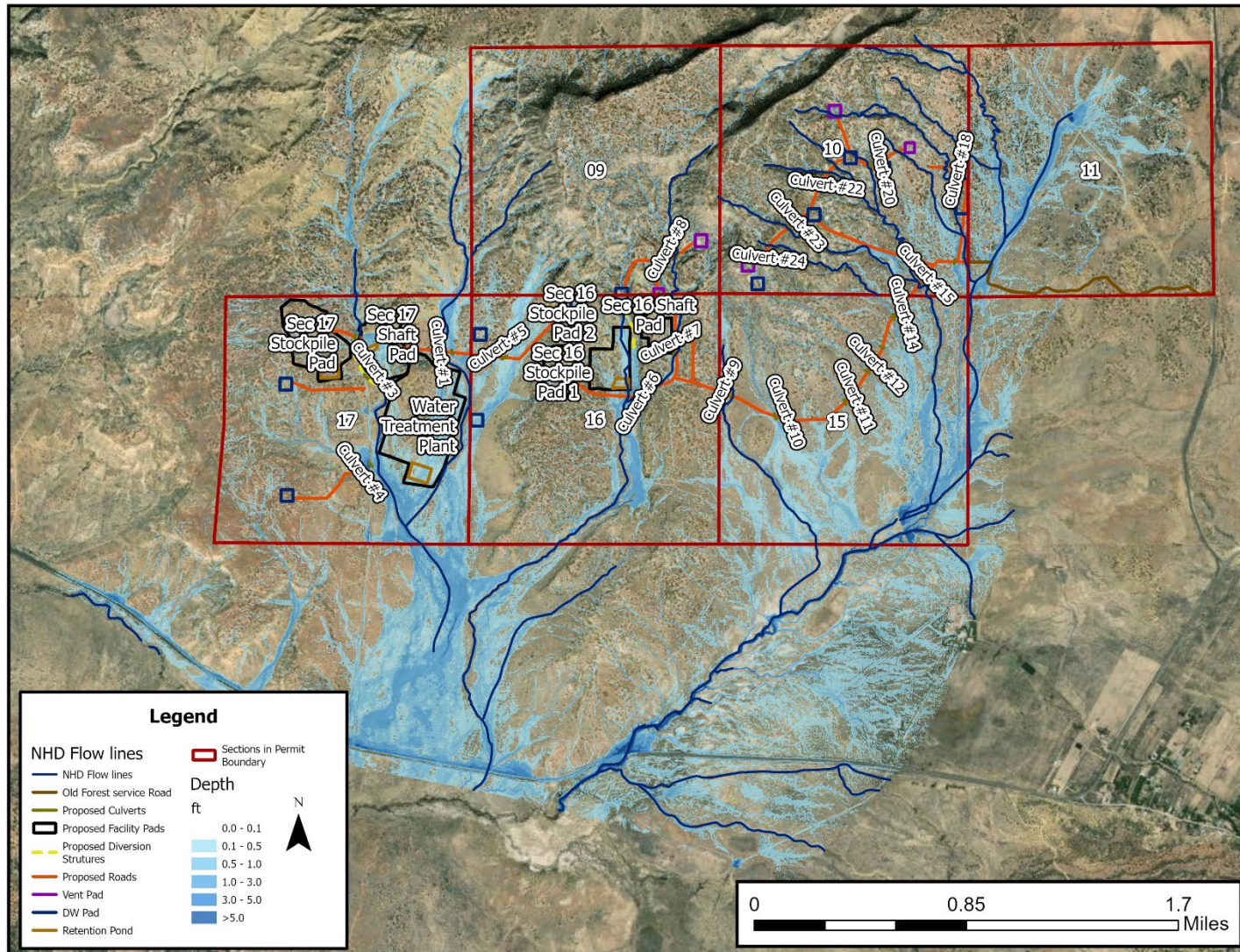


Figure 10: Preliminary Site Layout Plans for Project Area with Existing Conditions Flood Model 100-year 24-hour Storm Results

Roca Honda Mine – Preliminary Surface Water Management Plan

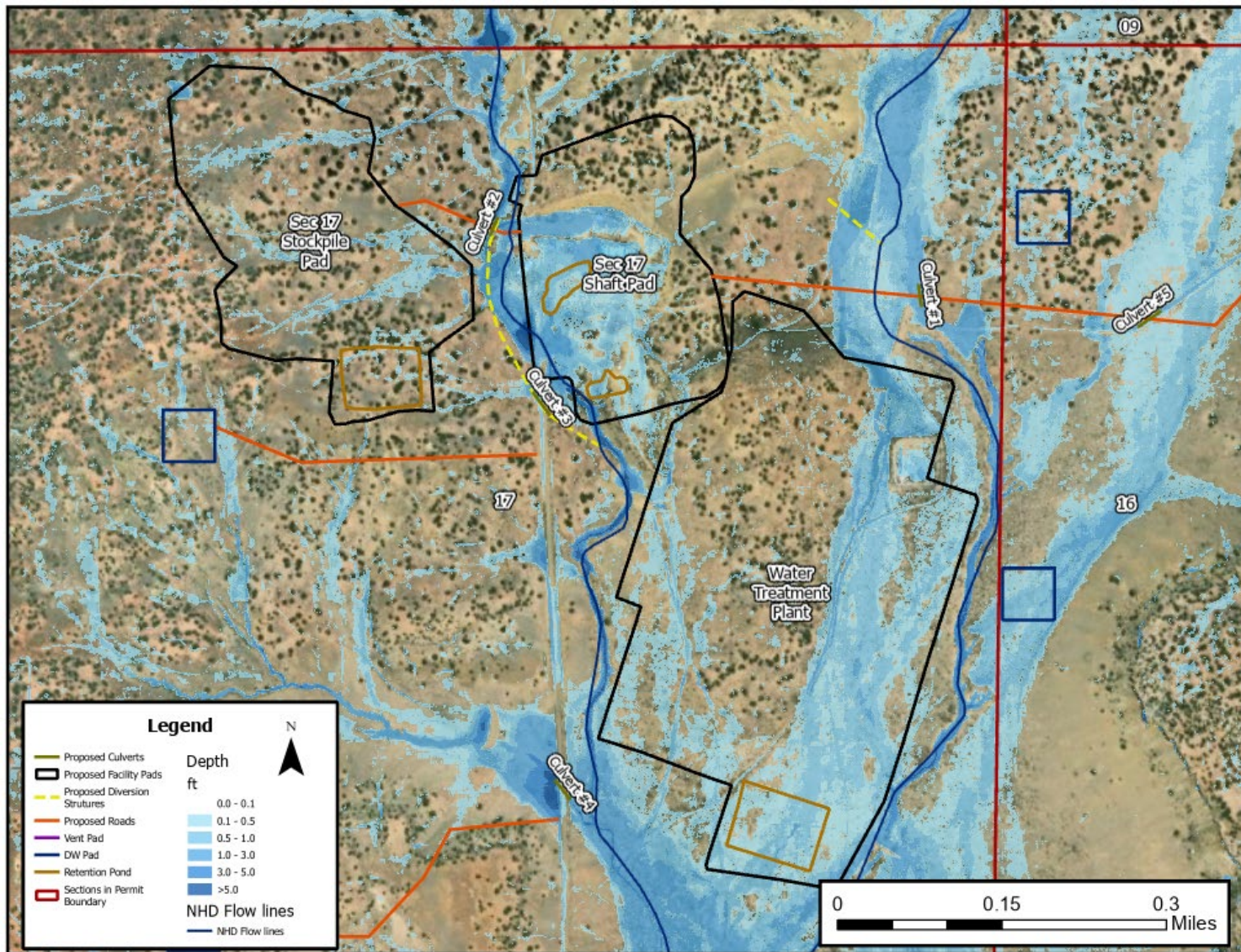


Figure 11: Preliminary Site Layout - Section 17 Facilities with Existing Conditions Flood Model 100-year 24-hour Storm Results

Roca Honda Mine – Preliminary Surface Water Management Plan

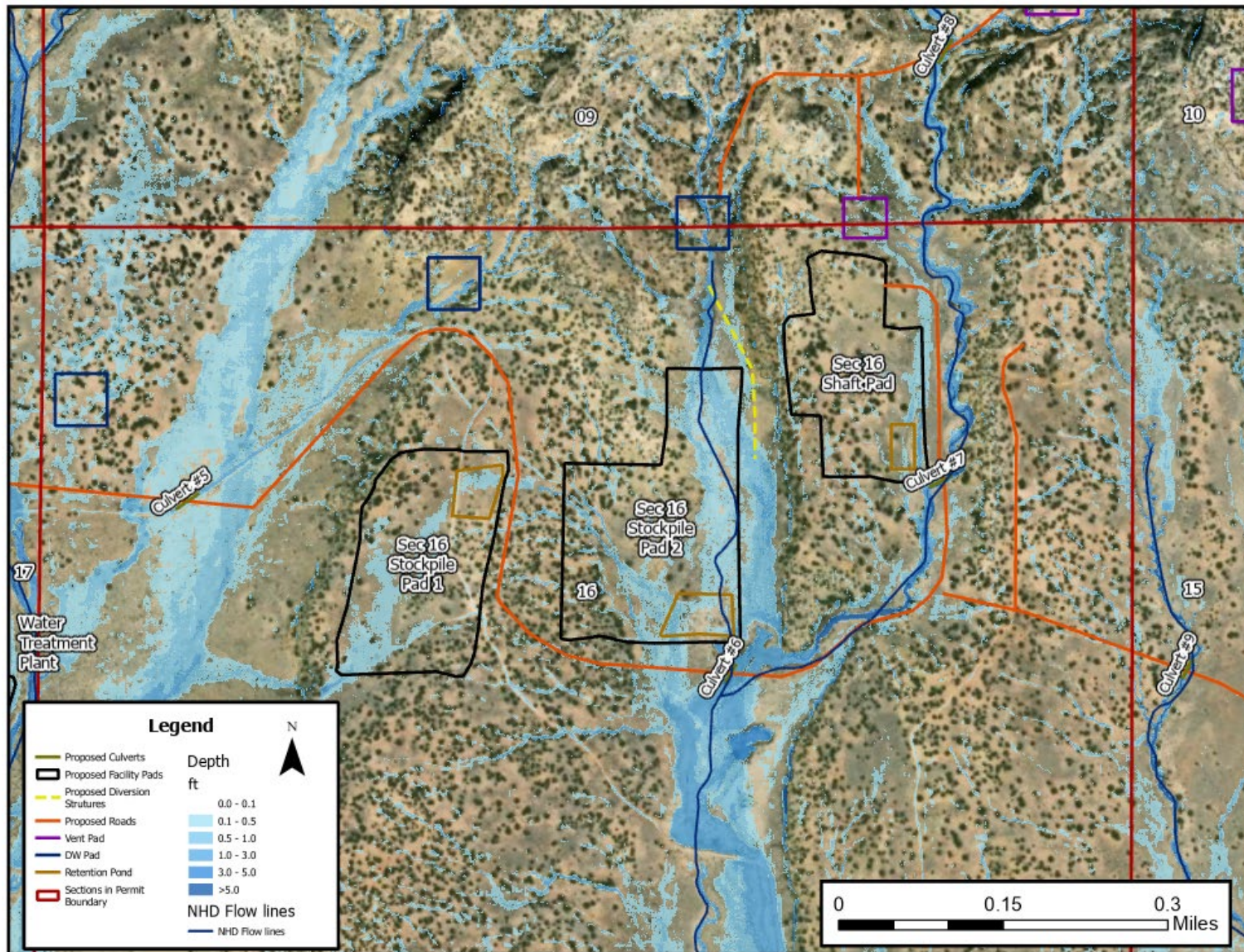


Figure 12: Preliminary Site Layout - Section 16 Facilities with Existing Conditions Flood Model 100-year 24-hour Storm Results

Roca Honda Mine – Preliminary Surface Water Management Plan

Table 4: Summary of Stormwater Control Elements in Surface Water Management Plan

Constraint	Description	Mitigation Strategy
Flooding Near Portal Pad (Sec 17 Shaft Pad)	The proposed footprint for the pad containing the mine portal and mine facilities (which is located where the existing production shaft and other existing mine infrastructure currently are) is adjacent to an existing wash. The existing condition model results show that the existing pad is inundated during the 100-year flood (see Figure 11), posing flood related risks to access, operation of facilities, and water ingress into the mine portal.	The proposed mitigation strategy is to divert the existing wash around the proposed footprint of the portal pad. Erosion protection to avoid lateral movement of the channel over time is recommended to manage flood related risks to the portal pad. The proposed diversion alignment also crosses roadways in two locations directly adjacent to the pad which can be managed with culvert crossings.
Section 16 Stockpile Pad 1	The proposed footprint for the pad containing a stockpile in Section 17 is located adjacent to an existing wash and would be partially inundated in the 100-year flood (see Figure 12) potentially posing flood related risks to access, operation of facilities, and erosion of stockpiled material.	The proposed mitigation strategy is to divert the existing wash around the proposed footprint of the portal pad. Erosion protection to avoid lateral movement of the channel over time is recommended to manage flood related risks to the stockpile pad.
Non-Contact Water Diversions	The model shows that proposed pad locations receive minimal runoff from upstream contributing areas. Based on project objectives, this water should be diverted away from the pads to prevent potential pollution of non-contact water and the surrounding natural environment.	Contributing areas and associated runoff above the proposed facilities are relatively small and can be diverted with berms constructed around the proposed facilities. Some of the proposed berm locations, such as the northeast corner of the Water Treatment Plant pad, receive more significant exposure to elevated hydraulics and may require erosion protection measures (e.g., riprap armoring).
Contact Water Capture	Precipitation falling directly onto mine facilities may runoff and erode mine-impacted sediments into the natural environment.	Runoff and eroded sediment will be captured in retention ponds where contact water can be pumped to the water treatment plant and eroded sediments can be managed. Stantec has assumed sediment within the retention ponds will be cleaned out annually (or more frequently).
Access Roadway - Wash Crossings	The proposed roadway alignments cross existing washes in several locations. The existing washes are uncontrolled and may erode the proposed roadways or prohibit access via existing roadways with ford (or low water) crossings.	Stantec has assumed that access to the site is required year-round and cannot be interrupted by frequent storm events that may happen multiple times a year. Therefore, preliminary design of culverts to pass the peak discharge for the 100-year 24-hour storm has been prepared in these locations to maintain safety and site access.

The proposed condition drainage map considering this stormwater management plan is illustrated in Figure 13. Additional detail on the features in the plan is provided in the following subsections.

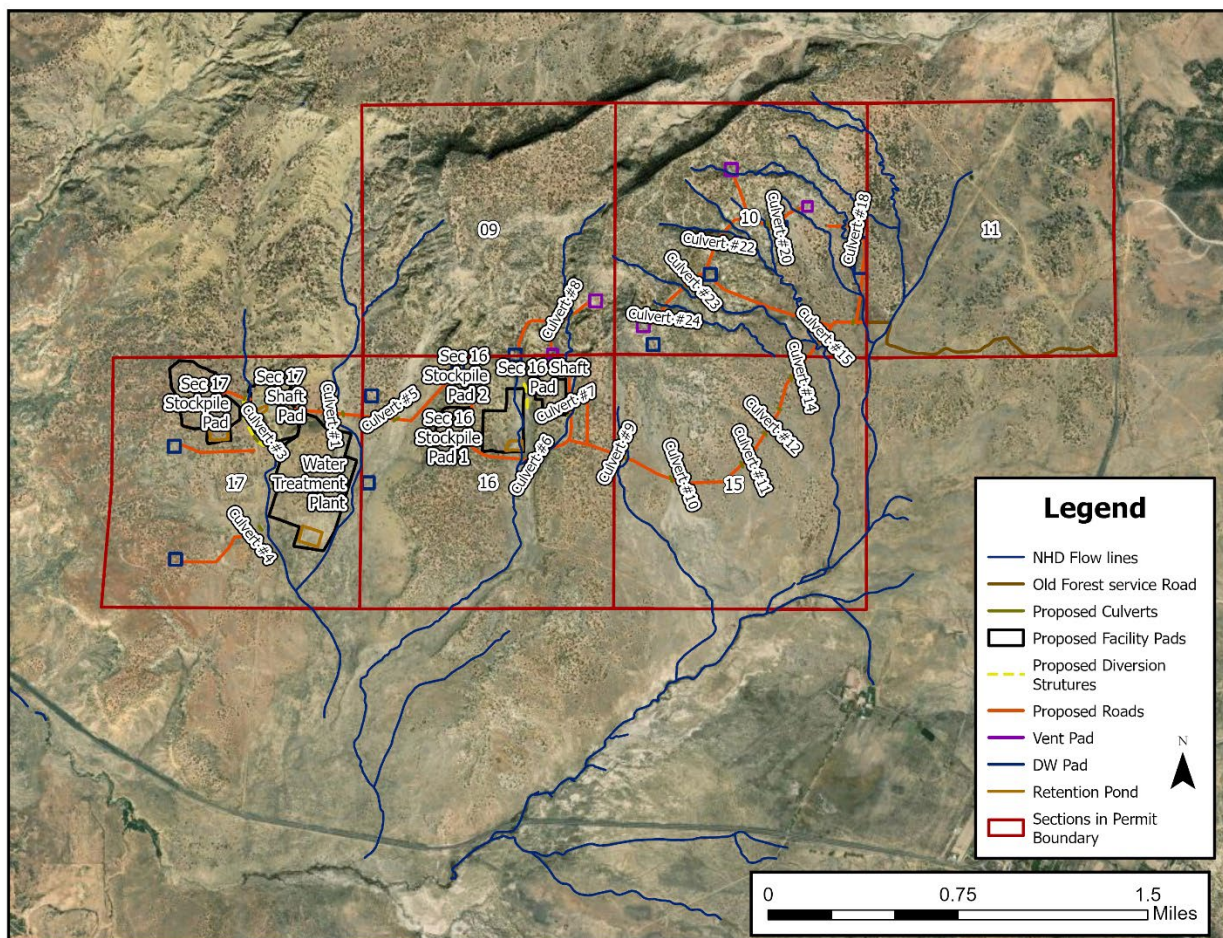


Figure 13: Drainage Map for Proposed Surface Water Control Plan

3.2.1 Diversion Structures

Alignments for diversion structures (e.g., berms and channels) are preliminary and were based on existing ground contours and/or preliminary pad grading plans and should be refined as the footprint and grading plan for each pad are further developed. The most significant diversion structure included in the preliminary plan is the diversion of the existing wash adjacent to the portal pad (see Figure 14). A diversion berm is recommended to divert the existing wash adjacent to the Water Treatment Plant (WTP) as shown in Figure 14. Existing condition discharge rates are similar to the portal pad area (~800 cfs) and the diversion berm will likely require erosion protection. A diversion channel north of Section 16 Stockpile Pad 2 is recommended as shown in Figure 15. Stantec developed preliminary sizing for these structures to effectively divert the peak discharge associated with the 100-year 24-hour storm event as follows:

Roca Honda Mine – Preliminary Surface Water Management Plan

- Diversion channel in Section 17: 20' bottom width, 3H:1V side slopes, 6' depth
- Diversion berm in Section 17: 4' tall, 3H:1V side slopes
- Diversion channel in Section 16: 20' bottom width, 3H:1V side slopes, 3' depth

Design for diversion structure alignments, size, and erosion protection requirements should be refined as the site layout and relevant design criteria are further developed.

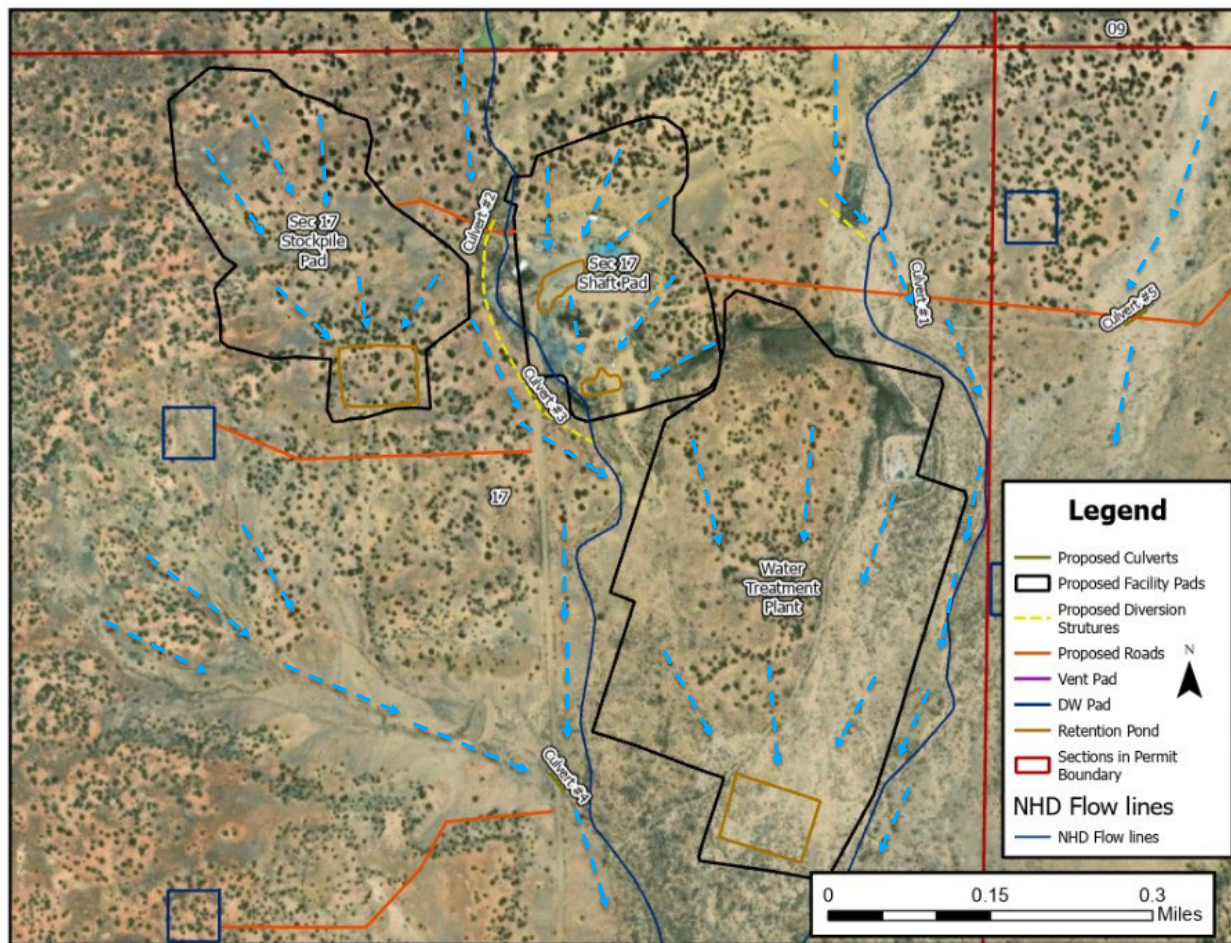


Figure 14: Section 17 Shaft Pad Diversion Channel and WTP Diversion Berm Proposed Alignments

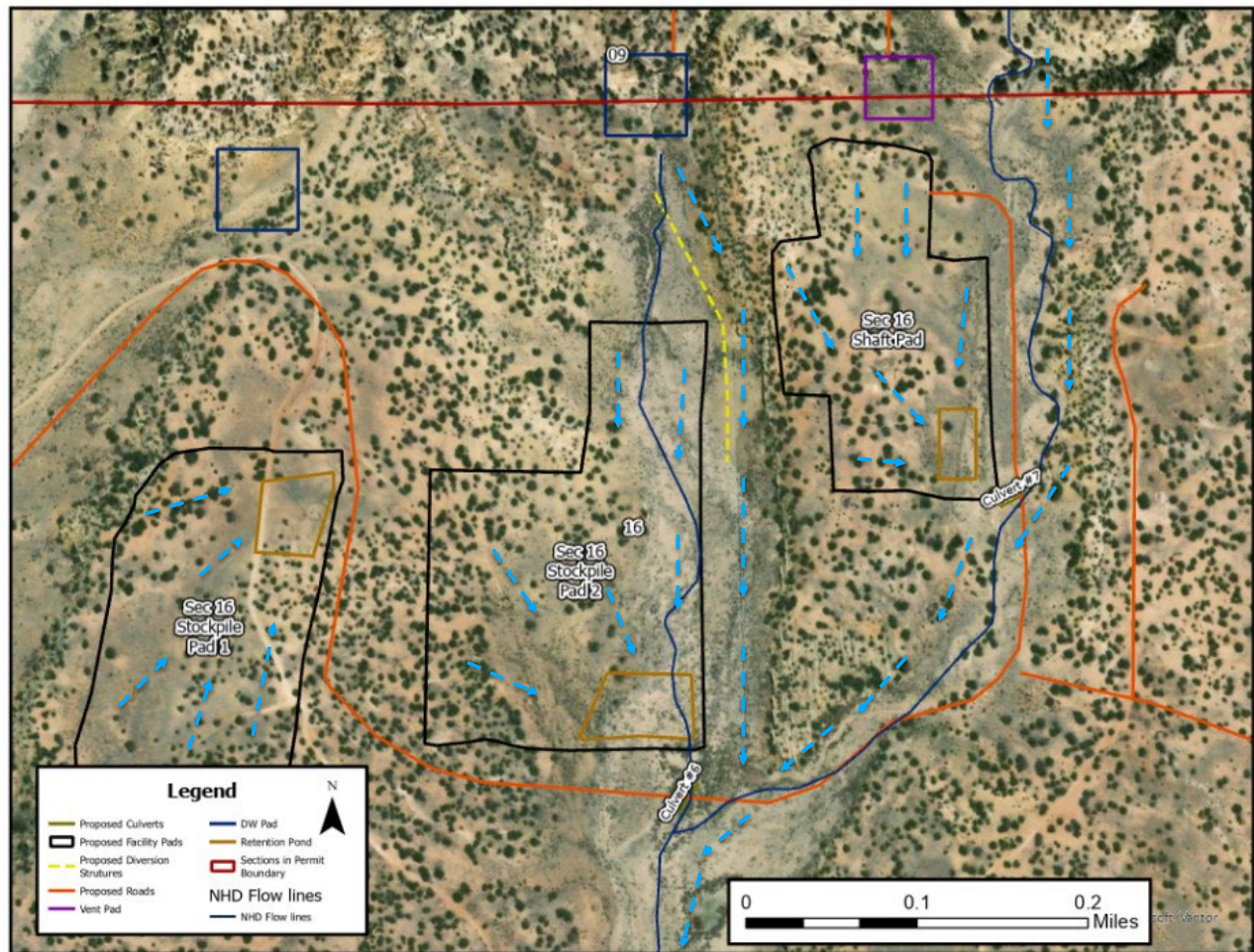


Figure 15: Section 16 Stockpile Pad 2 Diversion Channel Proposed Alignment

3.2.2 Retention Ponds

Retention ponds are included in the design to capture contact water for each mine facility pad. Stantec developed preliminary volume requirements for each pad using the Rational Method for water volume estimation and the Revised Universal Soil Loss Equation (RUSLE) for sediment volume estimation.

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The Rational Method adapted for runoff volume estimation is provided below.

$$V = C * \left(\frac{P}{12}\right) * A \quad \text{Equation 1}$$

Where:

- V = Runoff volume (ft³)
- C = Runoff coefficient (unitless). Taken as 0.9125 based on average value for heavy industrial areas from Maricopa County (AZ) guidelines (FCDMC, 2018)
- P = 100-year 24-hour precipitation depth, taken as 2.43 inches
- A = Facility pad area (ft²)

The RUSLE equation for estimating eroded sediment from each pad for a single year is provided below.

$$A = R * K * LS * C * P \quad \text{Equation 2}$$

Where:

- A = Total Soil Loss per Unit Area (tons/acre)
- R = Rainfall Erosivity Factor (unitless), determined as 19.55 using the EPA's online tool "Rainfall Erosivity Factor for Small Construction" (EPA, 2025)
- K = Soil Erodibility Factor (tons/acre), taken as 0.27 based on guidelines for sandy loam soil from Schwab, G., et al. (1981)
- LS = Slope Length-Steepness Factor (unitless), calculated as $LS = \sqrt{l} (0.0076 + 0.53s + 7.6s^2)$
- C = Cropping-Management Factor (unitless), taken as 1.0 based on guidance from Wischmeier and Smith (1978) using the table for pasture, range, and idle land with no appreciable canopy or vegetal ground coverage
- P = Conservation Support Practice Factor (unitless), taken as 1.0 (no conservation practice)

Sediment volume was calculated from the estimated weight using an assumed soil density of 110 lbs/ft³. Total required retention volume was calculated as the sum of the 100-year 24-hour event runoff volume and annual sediment yield estimates described above. It is likely that the cleanout of sediment in the ponds (using a vacuum track or similar means) will occur much more frequently than once a year and therefore the volume provided may be optimized as operational details are refined.

Sediment volume and runoff estimates do not consider detailed layouts within the pad areas (e.g., building footprints, paved areas, etc.) and should be refined in future design phases. Further, the erosion estimates consider a uniform, preliminary estimate of soil type for pads and should be updated as additional information is available, such as the properties of each stockpiled material type and additional sediment controls that may be implemented. Table 5 summarizes the required retention pond volumes for each major facility/pad, with the exception of the water treatment plant pad, which will treat underground and process water in addition to the contact water from direct precipitation on the pad. Future design updates will develop detailed grading for the ponds to provide the necessary volume plus freeboard.

Table 5: Retention Pond Volume Requirements

Facility/Pad	Required Retention Volume (tt ³)
Section 17 Stockpile Pad (Pad 1)	288,627
Section 17 Shaft Pad (Pad 2a/2b)	163,899
Section 16 Stockpile Pad 1 (Pad 3a)	127,982
Section 16 Stockpile Pad 2 (Pad 3b/3c)	165,828
Section 16 Shaft Pad (Pad 5)	104,923

3.2.3 Culverts

The surface water management plan identifies several locations where culverts are recommended at crossings between the site access roadways and existing ephemeral washes. Design criteria for culvert sizing should be established in future design phase(s). Preliminary sizing of the culverts considered the peak discharge for the 100-year 24-hour storm from the 2D model (described in Section 3.1), using calculations made in the Federal Highway Administration's (FHWA) HY-8 culvert analysis software. The preliminary culverts design are summarized on Table 6 and their proposed locations are shown in Figure 16.

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Table 6: Proposed Culvert Details

Culvert No.	Type	Span (ft)	No. Barrels	Flow (cfs)	Length (ft)	US Elev (ft)	DS Elev (ft)	Slope (ft/ft)
1	Concrete Box	6x6	2	441	75	7163.3	7162.4	0.012
2	Concrete Box	5x5	2	390	52	7159.4	7158.6	0.015
3	Concrete Box	5x5	3	700	136	7149.4	7145.4	0.029
4	CMP	3	1	45	95	7101.4	7099.7	0.018
5	CMP	4	1	80	94	7171.8	7169.6	0.023
6	Concrete Box	6x6	3	890	78	7183.2	7182.3	0.012
7	Concrete Box	6x6	2	600	131	7219.6	7218.6	0.008
8	Concrete Box	6x6	2	465	109	7274.4	7269.6	0.044
9	CMP	5	1	125	140	7167.9	7164.4	0.025
10	Concrete Box	5x5	1	173	100	7157.9	7156.3	0.016
11	CMP	4	1	60	88	7149.03	7146.6	0.028
12	CMP	4	1	65	90	7153.6	7150.7	0.032
13	CMP	4	1	66	78	7163.8	7160.4	0.044
14	CMP	4	1	66	92	7167.8	7166.3	0.016
15	Concrete Box	6x6	2	556	99	7162.02	7160	0.020
16	CMP	5	2	338	94	7171.3	7169.9	0.015
17	CMP	5	2	320	73	7175.8	7174.6	0.016
18	CMP	6	1	205	103	7224.4	7220.7	0.036
19	CMP	3	1	20	110	7314.9	7296.8	0.165
20	CMP	4	1	45	172	7341.2	7323.1	0.105
21	CMP	4	1	61	201	7409.6	7369.9	0.198
22	CMP	4	1	48	220	7421.4	7397.6	0.108
23	CMP	4	1	70	138	7502.0	7466.28	0.26
24	CMP	4	1	30	95	7527.7	7513.6	0.15

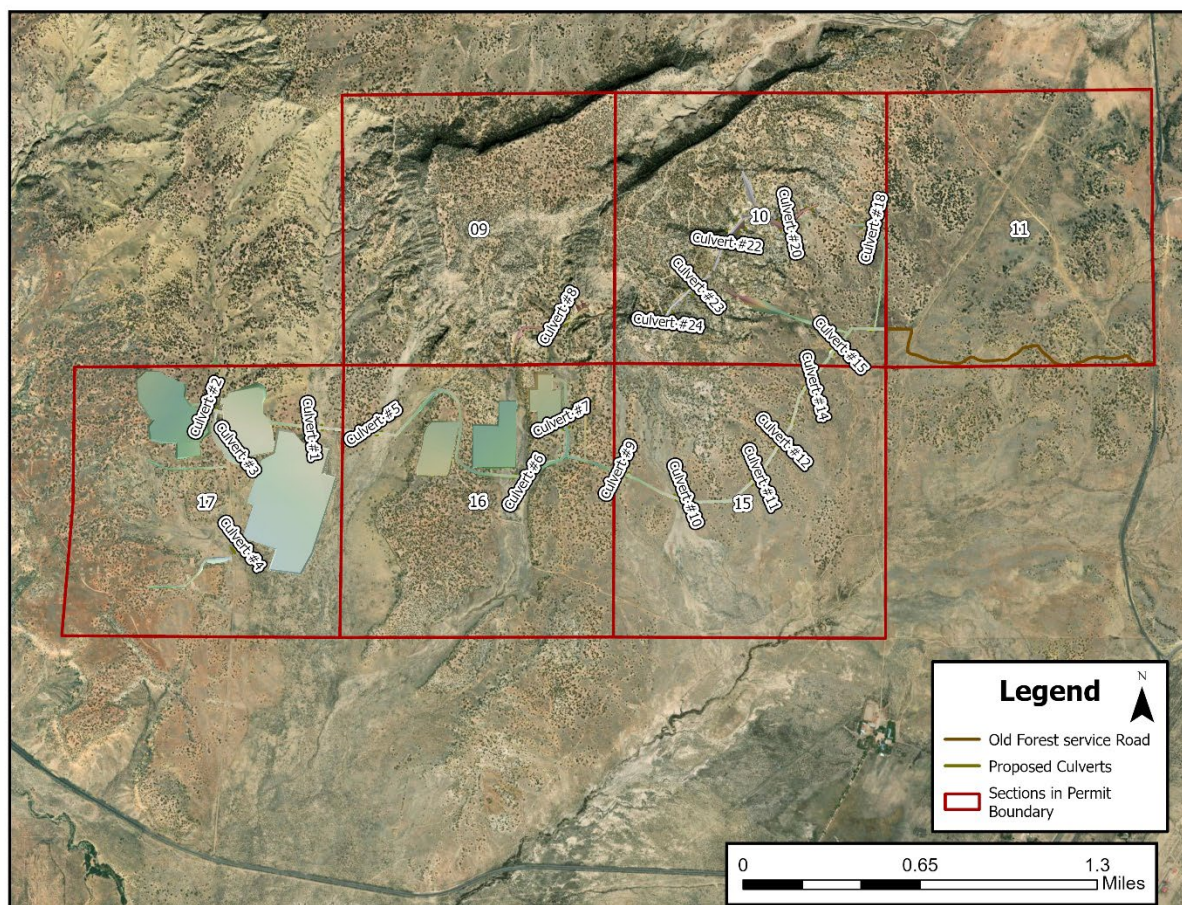


Figure 16: Proposed Culverts Locations

3.3 Proposed Conditions Flood Model

Stantec updated the 2-dimensional (2D) combined hydrologic/hydraulic model described in Section 3.1 to simulate the rainfall-runoff response of the project area under the 100-, 25- and 5-year 24-hour storm considering the proposed condition terrain. The main text focuses on the 100-year flood; results for other events, alongside details on the development of the model, are provided in Attachment A. Figure 17 through Figure 22 provides a summary of the simulated 100-year flow depths and velocities within the project area considering the proposed conditions terrain.

It should be noted that the grading on the pads has not been developed in detail nor have the retention ponds or perimeter berms around the pads been included in the terrain. As such, direct precipitation collects in the current low spots of the preliminary grading plan for each pad. Even without the proposed perimeter berms represented in the terrain, runoff to the pads as predicted by the model is limited in nature. Future design updates will adjust the grading to incorporate perimeter berms, the retention ponds, and adjust grades to direct water into the ponds as shown in the drainage maps (see Figure 13 to Figure 15).

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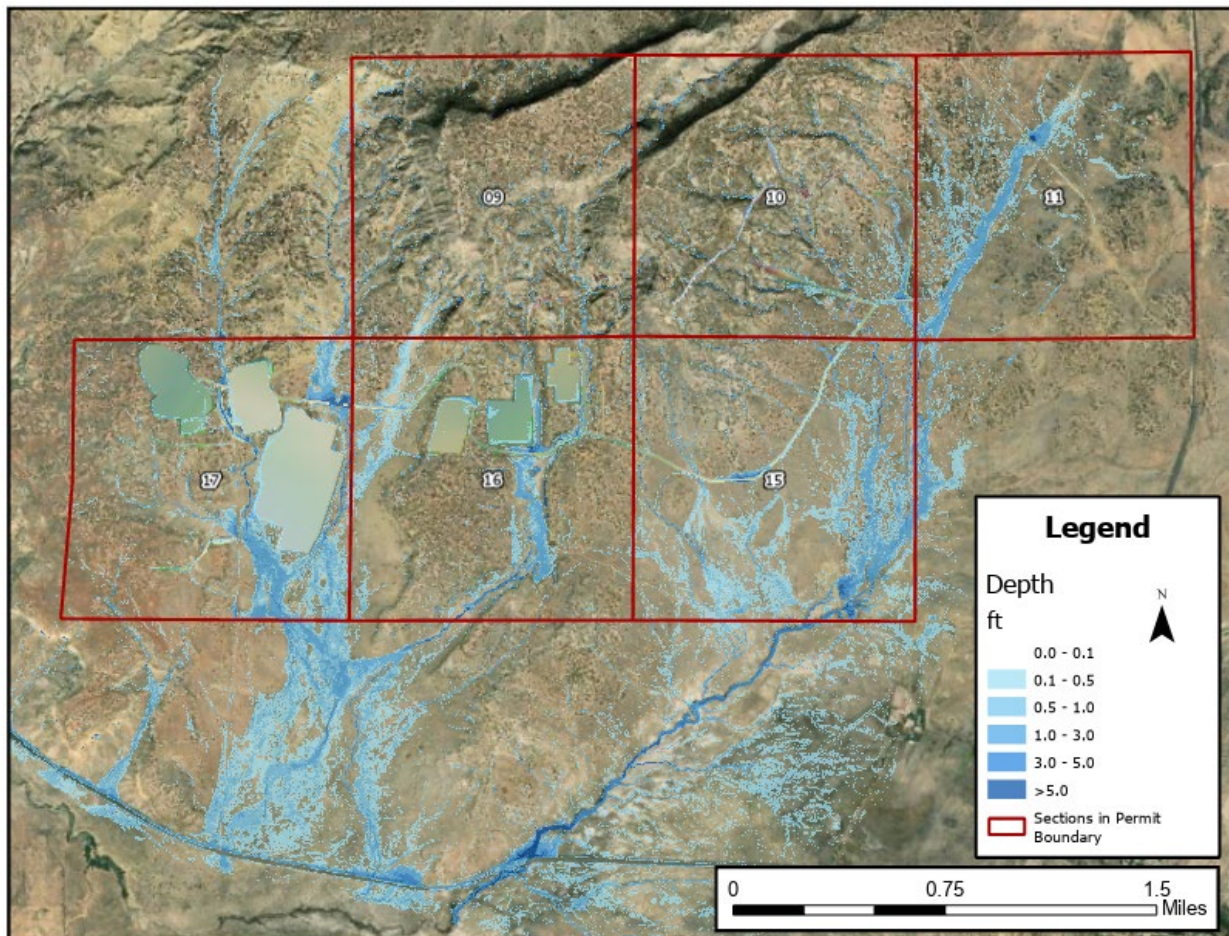


Figure 17: Proposed Conditions Flood Model Flow Depth 100-yr Results within the Project Area

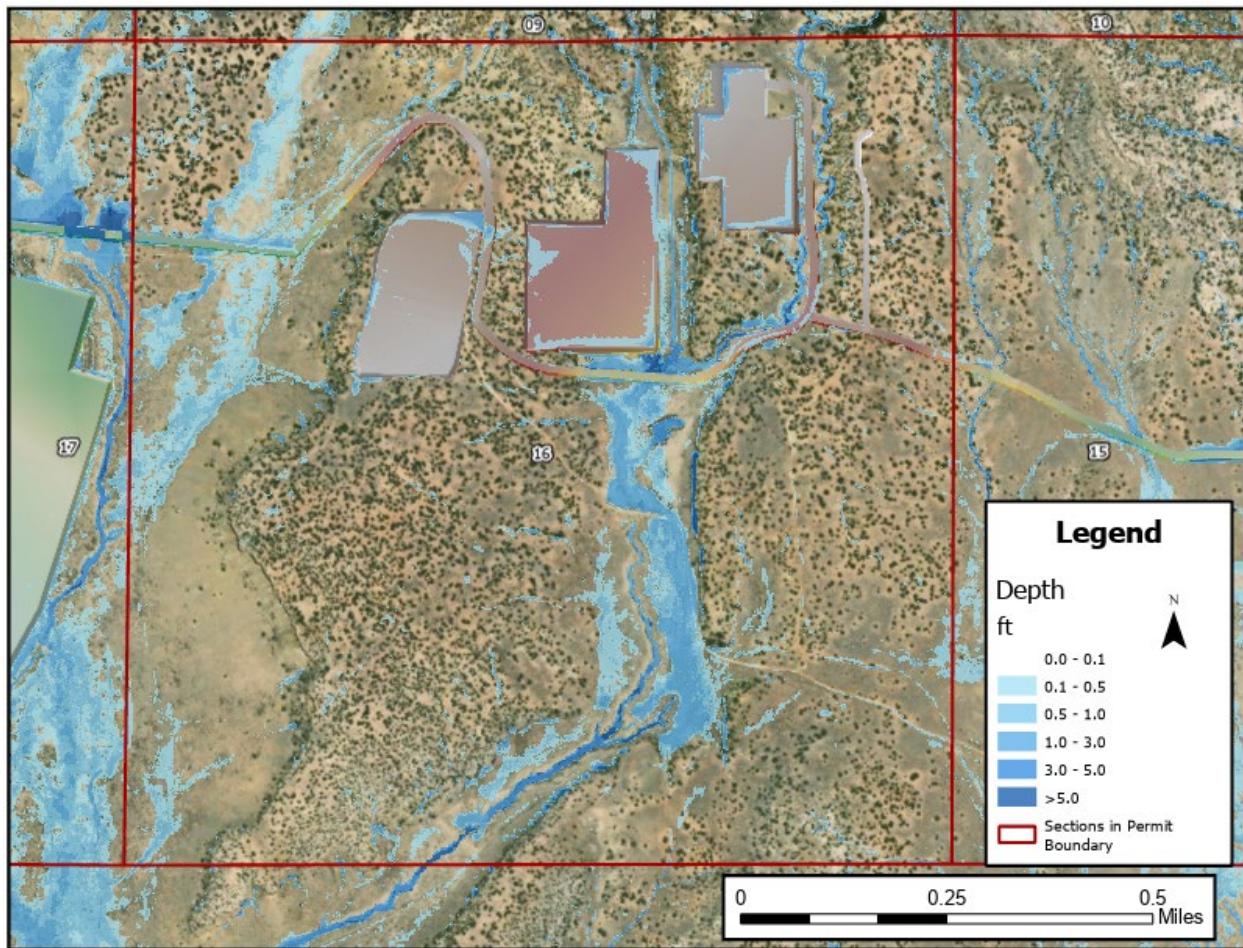


Figure 18: Proposed Conditions Flood Model Flow Depth 100-yr Results within Section 16

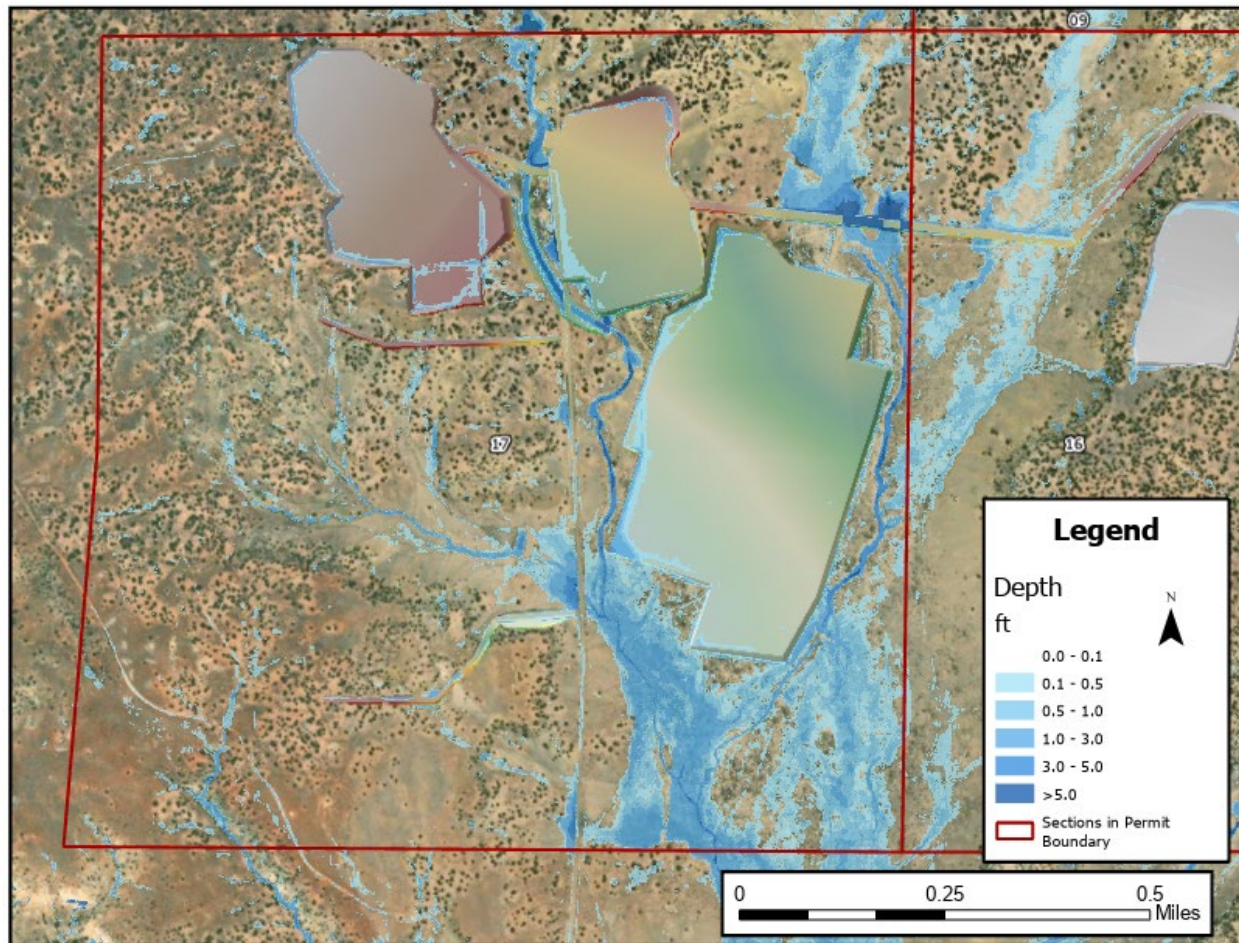


Figure 19: Proposed Conditions Flood Model Flow Depth 100-yr Results within Section 17

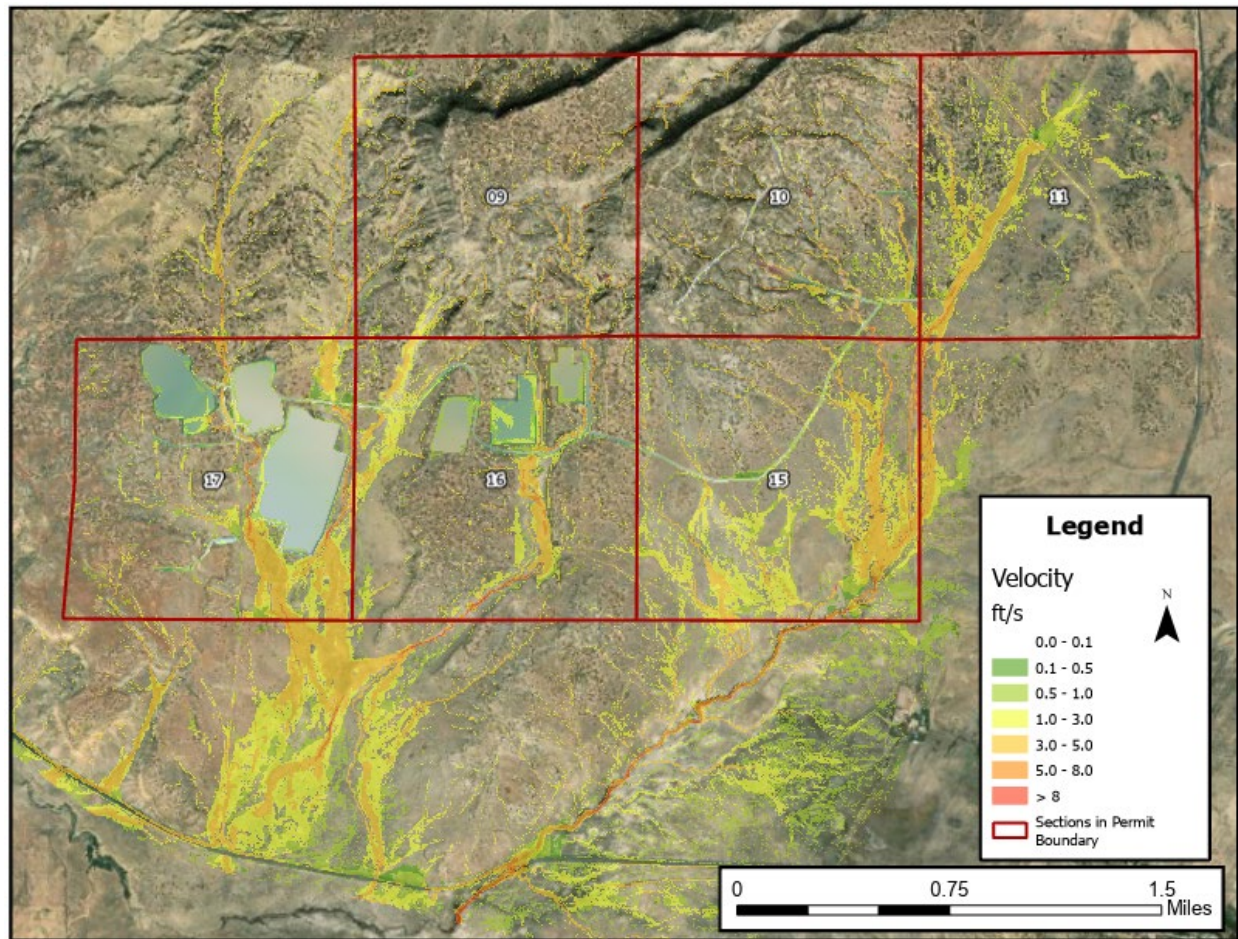


Figure 20: Proposed Conditions Flood Model Flow Velocity 100-yr Results within the Project Area

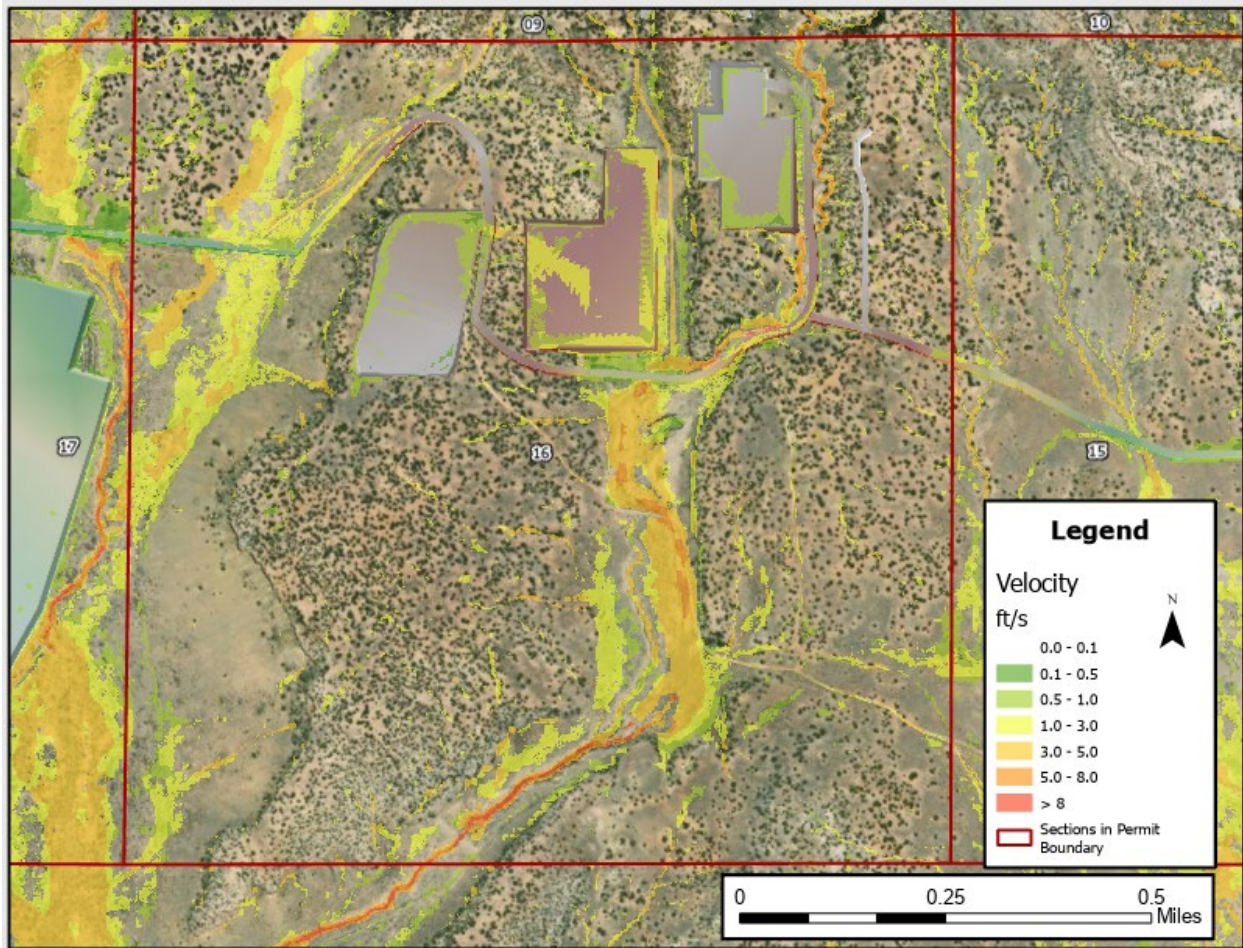


Figure 21: Proposed Conditions Flood Model Flow Velocity 100-yr Results within Section 16

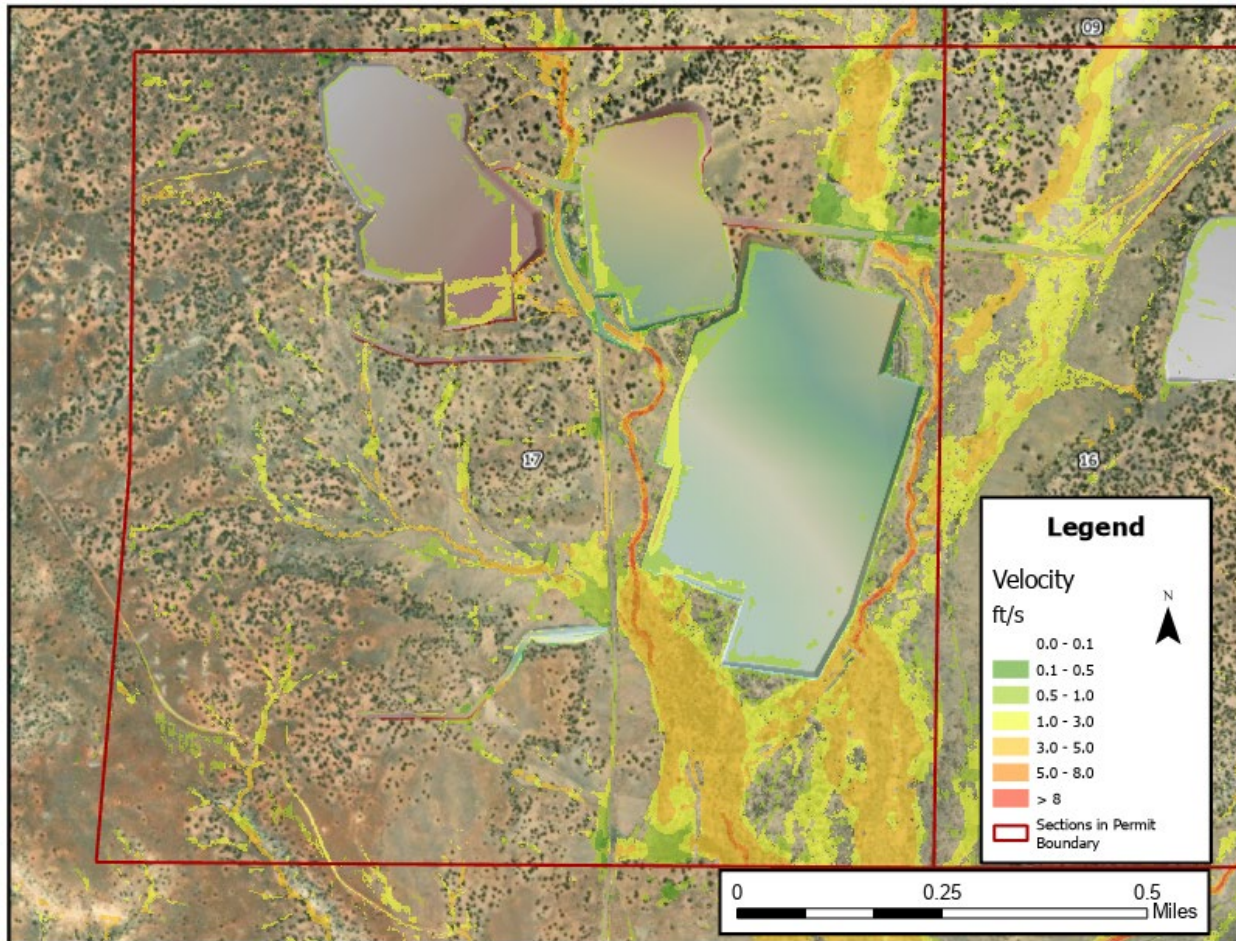


Figure 22: Proposed Conditions Flood Model Flow Velocity 100-yr Results within Section 17

Figure 17 through Figure 22 provide the results for the proposed condition hydraulic model for the 100-year storm. Figure 19 shows the proposed culverts and diversion channel between the Section 17 Stockpile Pad and the Section 17 Shaft Pad are effective in conveying the 100-year flow away from the pads and downstream. Figure 22 shows increased velocities (compared to existing conditions) along the proposed diversion channel, indicating the erosion protection will be necessary. Figure 22 also shows increased velocities at the toe of the southeast section of the Water Treatment Plant pad, indicating erosion protection for the pad fill may also be necessary. Figure 18 shows the effectiveness of the diversion channel in preventing water from flowing onto the Section 16 Stockpile Pad 2. Similar to the other proposed diversion channel in Section 17, Figure 21 indicates increased velocities (relative to existing conditions) in the diversion channel indicating the need for erosion protection measures.

4 Conclusions and Recommendations

This report has been prepared to outline the supporting evaluations and development of the preliminary stormwater management plan for the Roca Honda Mine. Based on review of publicly available data and assessment of existing hydrologic conditions in the project area, Stantec has identified areas with flood-related hazards that were avoided (where possible) during the layout of the mining facilities associated with the project. Following siting of mine facilities, Stantec prepared a preliminary surface water management plan to meet the objectives listed in Section 1.2. This plan includes several diversion channels/berms to separate contact and non-contact water, retention ponds for capturing stormwater and eroded sediments generated within mine-disturbed areas, and culvert locations for the several road crossings of existing ephemeral washes within the project area. Stantec developed preliminary design for culverts and major diversions and simulated the hydraulics for the proposed condition terrain. The plan presented herein is preliminary in nature and should be refined and the design of mine-related facilities is advanced. The following summarize the recommendations related to surface water that should be completed in future design phase(s).

- Design criteria for surface water infrastructure control elements (i.e., design storm for diversions, culverts, ponds, etc.) should be formally defined for the project. Selection of design criteria is a risk-based decision that can be supported by additional evaluations, as necessary, and should also comply with minimum standards applicable to the operation. Criteria may also consider more stringent standards for high-risk areas and/or potential influences as a result of climate change for features required for mine closure.
- The preliminary surface management plan has identified constraints and recommended high-level mitigations. Hydraulic simulations for proposed conditions demonstrated the effectiveness of the conceptual design's ability to divert flooding away from the proposed facilities.
- Comparisons between the existing and proposed condition model results show no apparent differences downstream of the proposed facilities. This suggests that managing sedimentation within the project area should mitigate potential for changes to sedimentation patterns downstream of the proposed facilities. Differences in hydraulics (depth, velocity, etc.) are observed within the project area adjacent to the proposed facilities, most notably where flow is confined into diversion channels or through culverts. The model shows these locations are typically associated with increases (relative to existing conditions) in velocity that may require erosion protection measures to mitigate potential changes to natural sedimentation patterns. The type and extent of erosion protection measures should be refined in future design phase(s).
- Following definition of design criteria and advancement of the site facilities plan, future design phases should include the following advancements related to the surface water management plan:
 - Update to sitewide hydrologic assessments that consider the proposed grading across the site and their impact on runoff generation (e.g., pads, roadways, stockpiles, paved areas, etc).

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- Detailed design of diversion channels/berms including the sizing, alignment, and erosion protection requirements for the diversion structures on site.
- Detailed design of culvert crossings that consider the hydrologic conditions for the proposed facility layout. Design should be advanced to specify installation details and erosion protection (where applicable).
- Refinement to the designs of the facility pads and retention basins including their locations on each pad and appurtenances necessary to direct water into the ponds, water volume estimate updates to consider detailed pad facilities (e.g., impermeable pavement vs permeable soil), and integration with pumps/pipes to transport contact water to the water treatment plant.

5 References

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Attachment A

Attachment A - Model Development Details

A.1 Objective

This attachment was prepared to provide details on the development of the 2-dimensional (2D) combined hydrologic and hydraulic flow model used to assess existing condition and proposed conditions flood rates, extents, and potential hazards during the 100-, 25-, and 5-year 24-hour storm within the project area. This document provides the methods used to develop the model, information on model performance, and modeling results.

A.2 Existing Conditions Flood Model

A.2.1 Model Development Details

Stantec evaluated the hydrology and associated hydraulic for the 100-year 24-hour storm events using a combined 2D hydrologic/hydraulic flow model built using the Hydrologic Engineering Center-River Analysis System (HEC-RAS; Version 6.4.1) developed by U.S. Army Corps of Engineers (USACE). The model was constructed as a rain-on-grid simulation, where a rainfall hyetograph is applied to the mode and routing throughout the computational domain according to the terrain data and other model inputs that influence the rainfall-runoff response (e.g., rainfall losses, surface roughness, etc.). Details on the various elements of the model are provided in the following subsections.

A.2.2 Topographic Data

Stantec used publicly available DEM data provided by the USGS via the National Map Viewer webtool. The USGS DEM resolution is 1-m (U.S.G.S 2024). (See Figure 23)

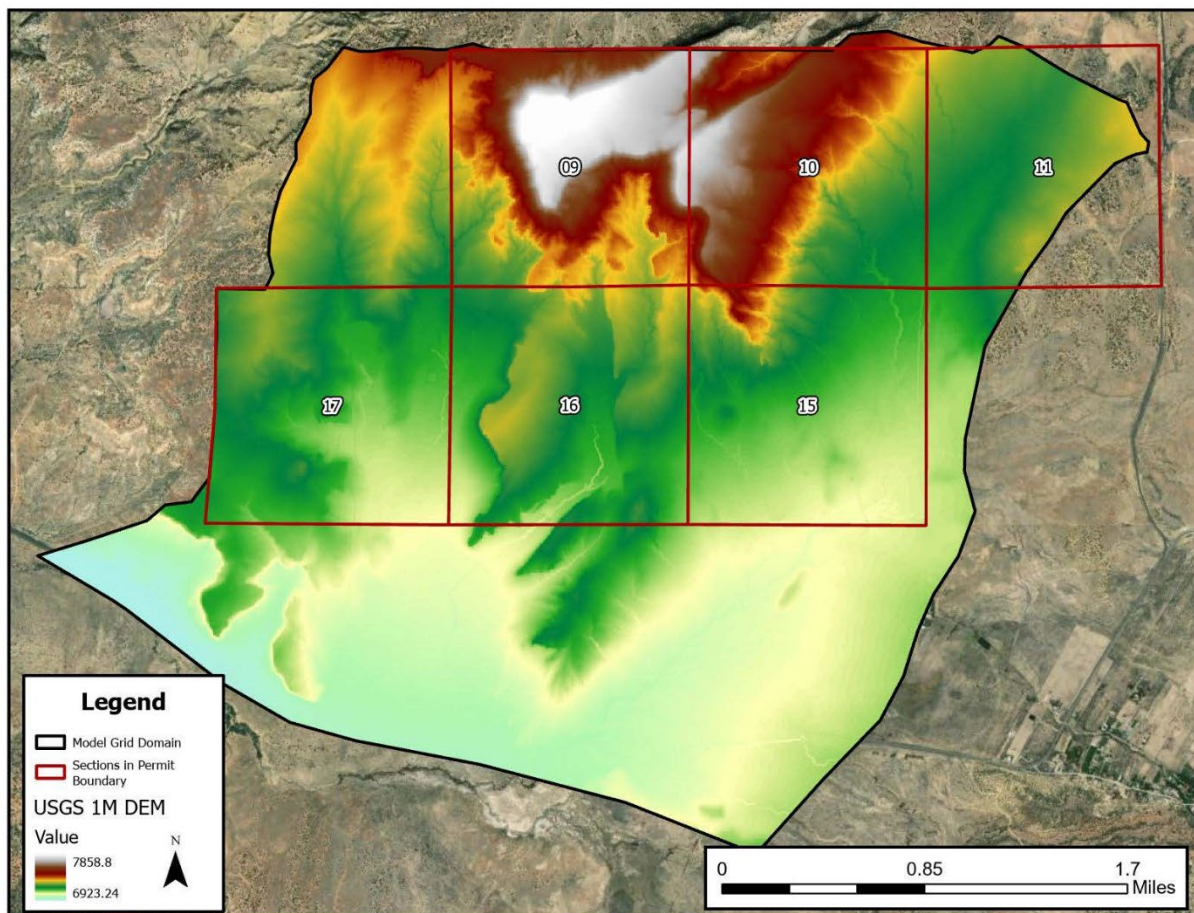


Figure 23: USGS 1-meter DEM

A.2.3 Rain-on-Grid Hyetograph

The 100-year 24-hour storms used in this study were developed based on precipitation estimates from NOAA Atlas 14. These depths were distributed using the alternating block storm pattern, which is a stacked, hypothetical distribution that simulates the rainfall intensity for sub-durations within a 24-hour period. The hyetograph applied in the model is shown in Figure 24. The terrain contains several locations where water is impounded before reporting to the ultimate outlet. To simulate the condition where minor storms preceding the 100-year storm fill these depressions, Stantec included 0.2 inches of incremental rainfall for a period of 18 hours prior to the onset of the 100-year 24-hour storm, as shown in Figure 24.

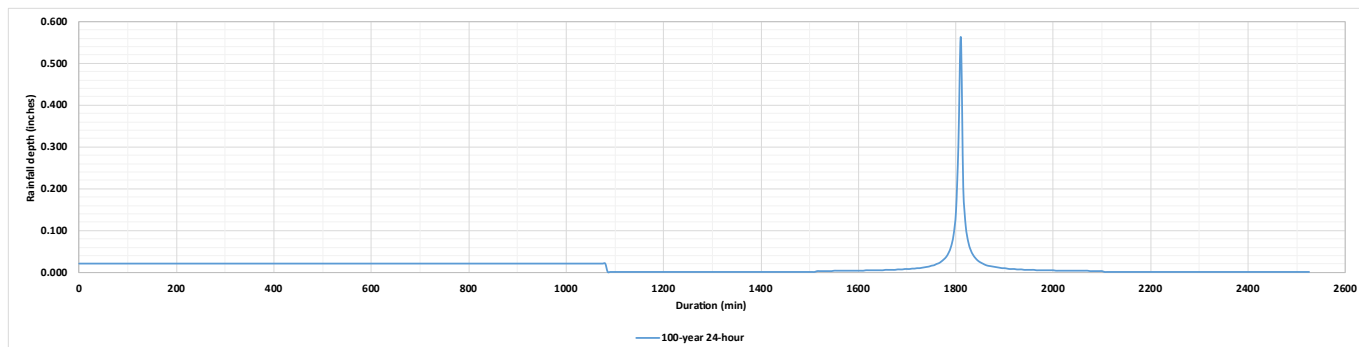


Figure 24: Rainfall Hyetograph used in HEC-RAS Model

A.2.4 Rainfall Loss

The model computed precipitation losses using the curve number (CN) method, which estimates precipitation excess as a function of cumulative precipitation, soil types, land use, and antecedent moisture. The inputs required for this loss method include curve numbers and abstraction ratio which were computed as a function of the local soil type and land cover. The local soil types, or hydrologic soil groups (HSG), were determined using the gridded soil survey geographic database (gSSURGO) (NRCS, 2020) across the domain of the model. The gSSURGO HSG delineations indicate the occurrence of Type A, Type B, Type C, and Type D soils as well as rock outcrops and un-defined “Mined Lands”. Stantec assigned curve numbers assuming the land cover type of “Desert Shrub” in “good” condition as described in the Technical Release 55 (TR-55) (NRCS, 2010). The curve numbers for the rock outcrop and mined lands areas were determined based on bare soil fallow cover types from TR-55. The CN value for rock outcrop assumed a type D soil due to the high runoff rates associated with shallow depth to bedrock. CN values for mined lands assumed a type C soil. Areas where no data was available assumed a Desert Shrub cover type with HSG group D.

A summary table of the curve numbers used in the model is provided in Table 7 and the spatial delineations of each curve number is displayed on Figure 25.

Table 7: Summary of Curve Number Values Assumed in the Model

Cover Type	Curve Number
Desert Shrub – HSG Type A	49
Desert Shrub – HSG Type B	68
Desert Shrub – HSG Type C	79
Desert Shrub – HSG Type D	84
Rock Outcrop	94
Uranium Mined Lands	91

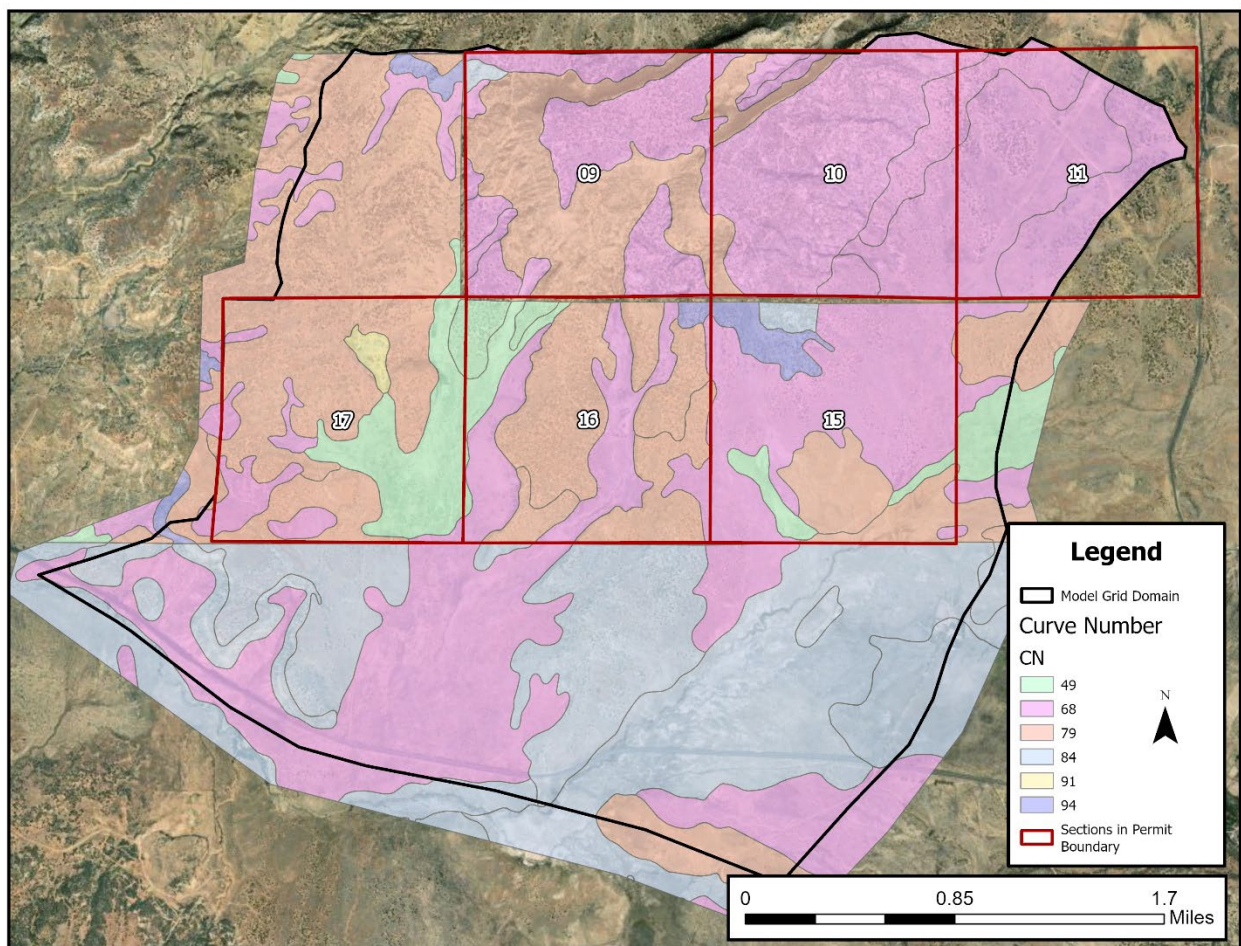


Figure 25: Final Curve Number Distribution used for Hydrologic Modeling

The initial abstraction (I_a) term is used to account for stormwater runoff losses to processes other than soil infiltration such as filling of depressions, wetting of vegetation, or evaporation. It can be determined from observed rainfall-runoff events for small watersheds, where lag is minimal, as the rainfall that occurs before runoff begins. Interception and surface depression storage may be estimated from cover and surface conditions, but infiltration during the early part of the storm is highly variable and dependent on such factors as rainfall intensity, soil crusting, and soil moisture. I_a was assumed to be a function of the maximum potential retention (S). An empirical linear relationship between I_a and S was established and an abstraction ratio of 0.05 was selected, based on the lower limit of recommended values from TR-55.

A.2.5 Manning's Roughness

Roughness values are used in the HEC-RAS model to account for the flow resistance effects caused by obstructions in the flow path such as stones or vegetation. Roughness is quantified through "Manning's n" values. Stantec assumed a "natural range" coverage type in the undisturbed upland areas of the model which contribute flows to the project area. Further, the roughness values assigned considered the effect of a given obstruction can vary depending on the flow depth. For example, a 6-inch diameter stone on the flow conveying surface is a more significant deterrent to a 1 ft deep column of water than a 5 ft deep column of water. As such, Stantec assigned a larger roughness value to the areas where sheeting type flow is anticipated to occur. A lower roughness value was assigned to low lying areas where flow accumulates, and the flow depths increase.

The roughness values assigned to the upland -sheet flow and accumulated flow areas are tabulated in Table 8 and illustrated on Figure 26.

Table 8: Roughness Values Associated with each Assigned Cover Type.

Cover Type	Roughness Value	Justification
Natural Range – Sheeting Flow (flow depth <1')	0.12	Sheet flow roughness for natural range cover (NRCS, 2010)
Natural Range – Accumulated Flow (flow depth >1')	0.06	Scattered Brush, Heavy Weeds (Chow, 1959)

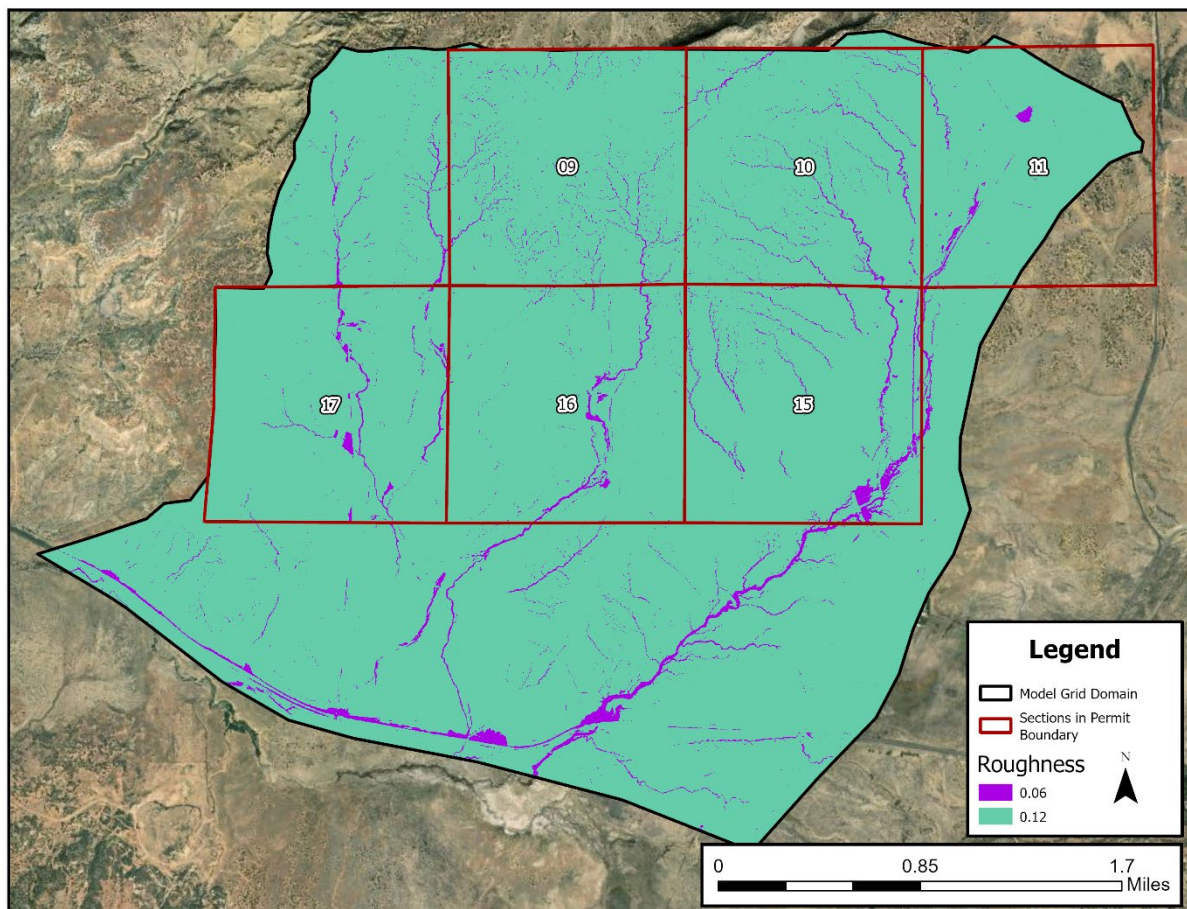


Figure 26: Manning's Roughness Cover Type used for the Hydrologic Model

A.2.6 Development of the Model Grid

Stantec set up the hydrologic model domain to encompass the entire drainage area that routes the proposed infrastructure in the project area. The model domain is made up of thousands of grid cells that represent the underlying terrain along each grid cell face. The base grid cell size used in the model was 25-ft x 25-ft. Breaklines were then used to provide better resolution of features like channels and berms that will convey or restrict water flow. The extent of the computational domain and breaklines used are illustrated in Figure 27.

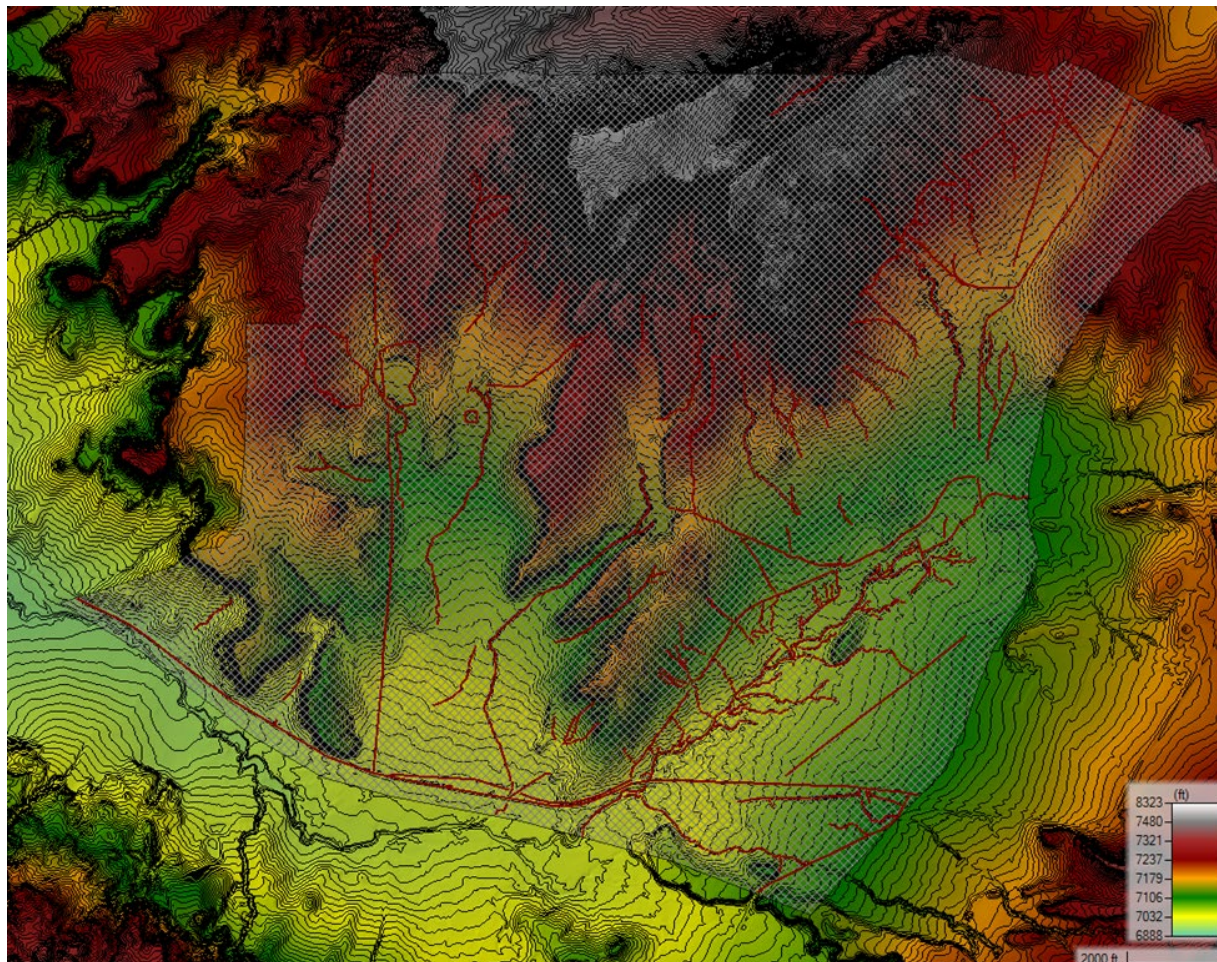


Figure 27: Model Computational Domain, Grid Cells, and Breaklines

A.2.7 Model Boundary Conditions

A.2.7.1 Internal Boundary Conditions

The model simulated inflow by applying the 100-year 24-hour event rainfall directly to the model grid using the rain-on-grid boundary condition. The model applied the 100-year 24-hour rainfall uniformly across the entire grid.

A.2.7.2 External Boundary Conditions

The external boundary conditions were placed as shown in Figure 28. For this study, normal depth condition was selected as the external boundary. This selection allows the modeler to enter an assumed energy slope as shown in Table 9; then HEC-RAS 2D computes the hydraulics at the outflow boundary assuming normal depth at the specified slope.

Table 9: External Boundary Conditions

Element ID	Energy Slope (ft/ft)
BC Line 1	0.04
BC Line 2	0.1
BC Line 3	0.08
BC Line 4	0.4

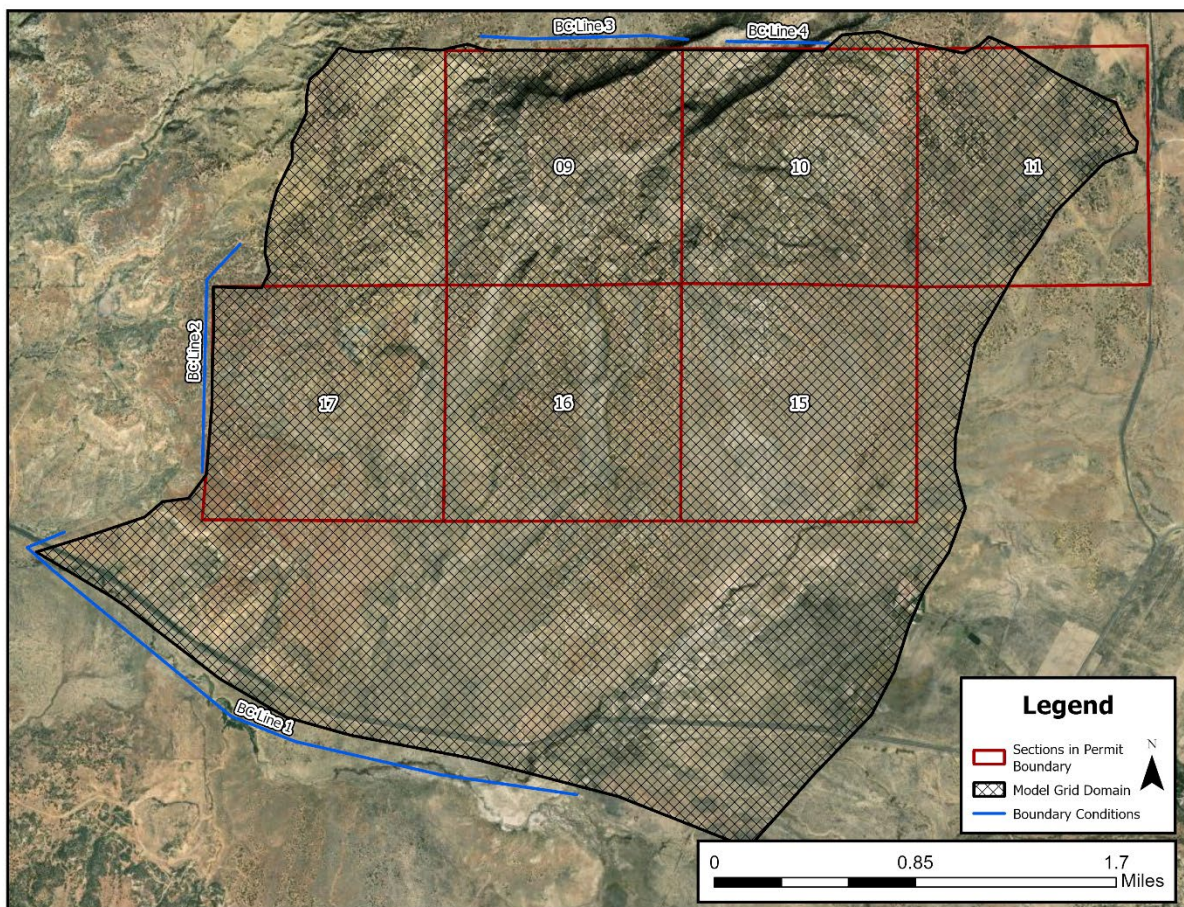


Figure 28: External Boundary Condition Locations

A.2.8 Computations Controls

Model was run using the Diffusion Wave equation set, which is a simplified version of the St. Venant equations that does not account for the effects of flow momentum. Future assessments may consider the use of more strict equation sets to evaluate hydraulics around specific structures or to support design calculations. The model was run for a period of 36 hours using a Courant Number controlled time step. The model computation control parameters used are displayed in Figure 29 and Figure 30

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General | 2D Flow Options | Pipe Systems | 1D/2D Options | **Advanced Time Step Control** | 1D Mixed Flow Options

☐ Fixed Time Step (Basic method) 5 Second

☒ Adjust Time Step Based on Courant

Maximum Courant: 1.

Minimum Courant: 0.45

Number of steps below Minimum before doubling: 5

Maximum number of doubling base time step: 2 20.00 sec

Maximum number of halving base time step: 5 0.16 sec

Courant Methodology

☒ Velocity/Length (face velocity * dt / cell to cell distance)

☐ Residence Time (cell outflow * dt / cell volume)

☐ Adjust Time Step Based on Time Series of Divisors Verify Dates ...

	Time Step	Date(ddMMMyyyy hhmm)	Divisor
1			0
2			0
3			0
4			0
5			0
6			0
7			0
8			0

Figure 29: Time Step Based on Courant Number Control

The screenshot shows the 'Unsteady Flow Analysis' window with the following settings:

- Plan:** 100yr 24hr 0.05 Abst
- Short ID:** 100yr 24hr 0.05 Abst
- Geometry File:** Roca Honda - 0.05
- Unsteady Flow File:** 100yr 24hr 0.05 Abst
- Programs to Run:**
 - ☒ Geometry Preprocessor
 - ☒ Unsteady Flow Simulation
 - ☐ Sediment
 - ☒ Post Processor
 - ☐ Floodplain Mapping
- Plan Description:** (Empty text area)
- Simulation Time Window:**
 - Starting Date:** 09JUN2025
 - Ending Date:** 11JUN2025
 - Starting Time:** 00:00
 - Ending Time:** 00:00
- Computation Settings:**
 - Computation Interval:** 5 Second
 - Mapping Output Interval:** 5 Minute
 - Hydrograph Output Interval:** 1 Minute
 - Detailed Output Interval:** 5 Minute
 - Project DSS Filename:** C:\Users\svinay\Stantec\BC 1829 - Water Resources - Gen...
- Status:** Time Step is controlled by courant condition.
- Buttons:** Compute

Figure 30: Set up Computation Plan

A.2.9 Model Results

The results of the hydraulic model were used during development of the site layout plan where Stantec attempted, to the extent possible, to avoid areas with potential for flood related hazards. A flood map showing the hydrologic model results (maximum depth and velocity) predicted for the model for the 100-year storm event are shown in Figure 38 and Figure 41 respectively. Hazard classification following guidelines from Smith (2014) and USBR are shown in Figure 44 and Figure 45, respectively.

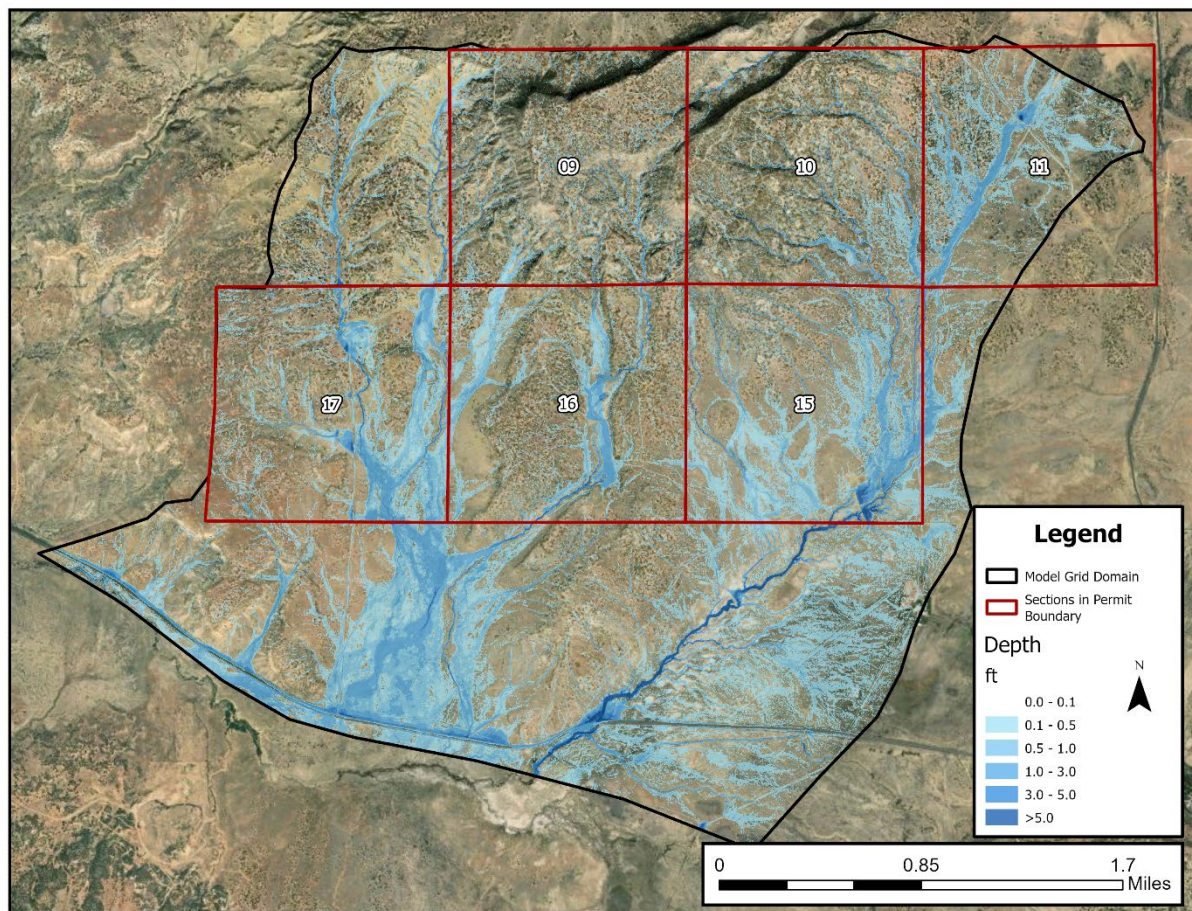


Figure 31: Flood Map with Maximum Depth for the 100-year 24-hour Storm event

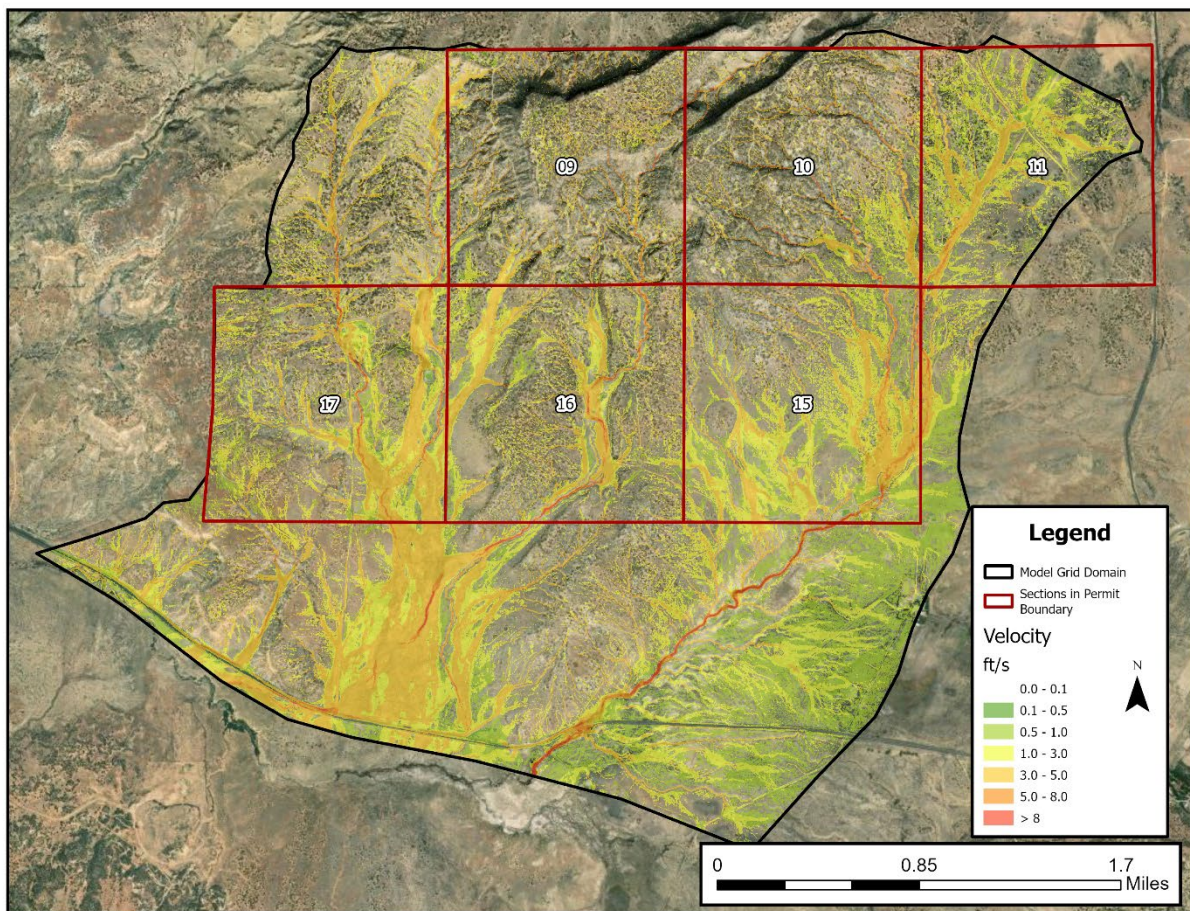


Figure 32: Flood Map with Maximum Velocity for the 100-year 24-hour Storm event

Roca Honda Mine – Preliminary Surface Water Management Plan

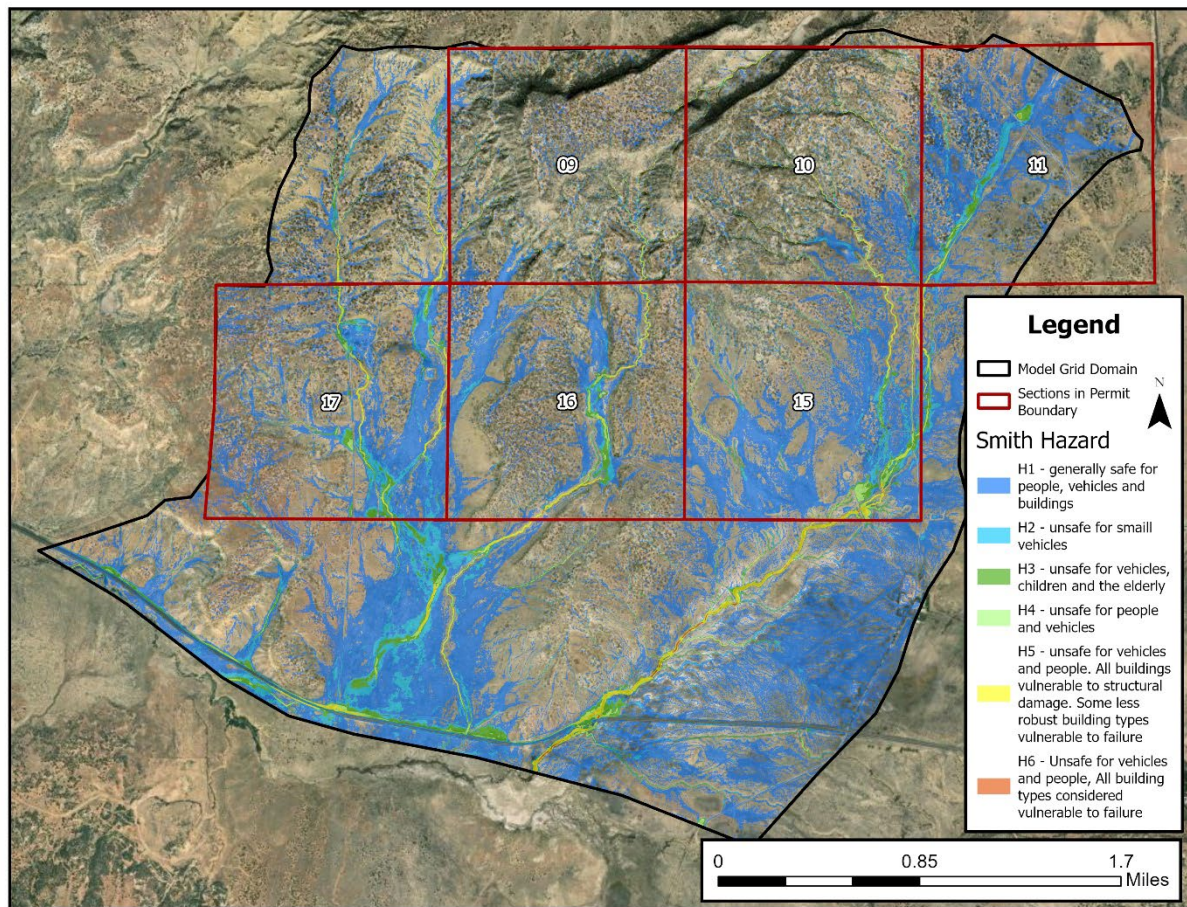


Figure 33: Flood Hazard Map Following Smith et. al Classifications (G P Smith, 2014)

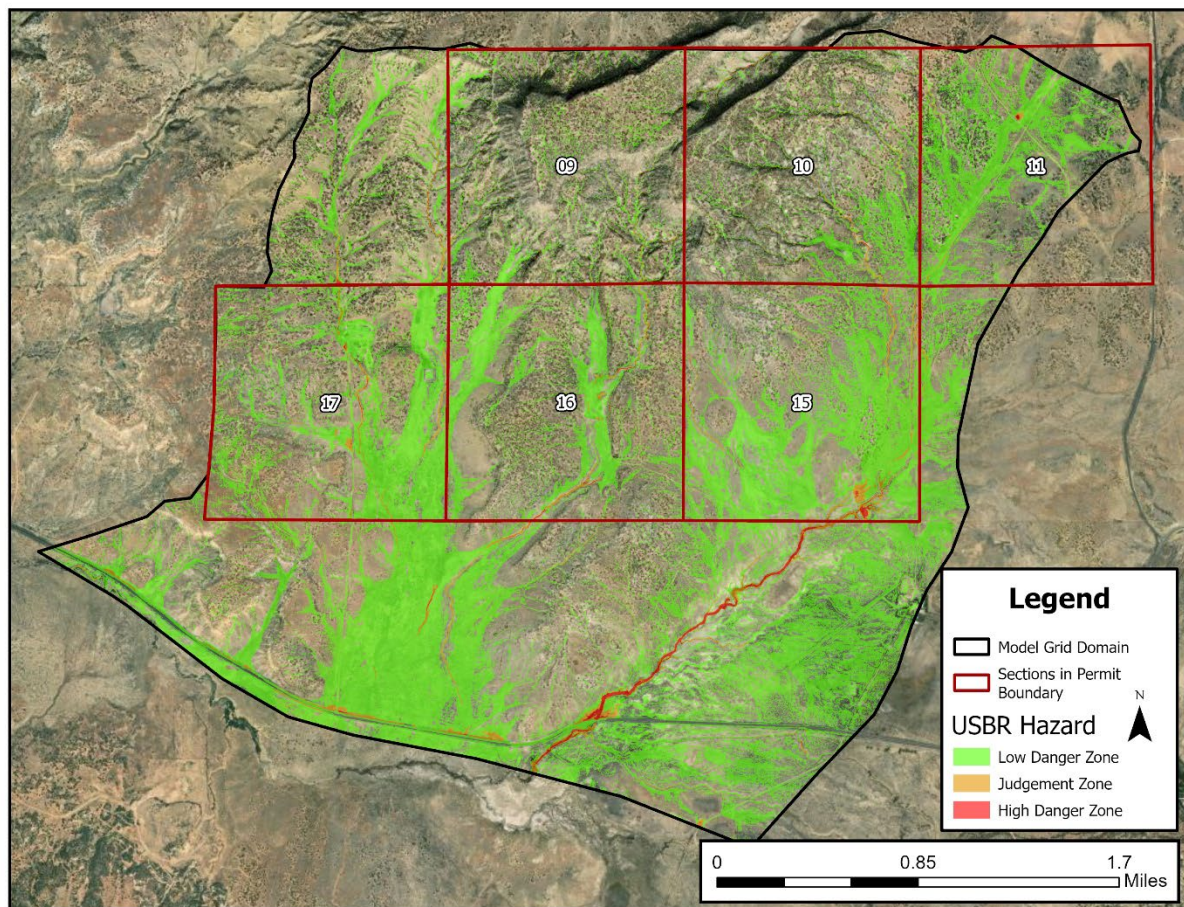


Figure 34: Flood Hazard Map Following USBR Classifications (USBR, 1988)

A.3 Proposed Conditions Flood Model

Stantec evaluated the hydrology and associated hydraulic for the 100-, 25-, and 5-year storm events for the proposed conditions flood model similar with the existing conditions model with exception of the topographic data, model grid development, and storm events. The details of the development of the proposed conditions model are provided in the following subsections.

A.3.1 Topographic Data

Stantec used publicly available DEM data provided by the USGS via the National Map Viewer webtool. The USGS DEM resolution is 1-m (U.S.G.S 2024). (See Figure 13) consistent with the existing conditions model and the preliminary grading for the proposed facilities as shown in Figure 35.

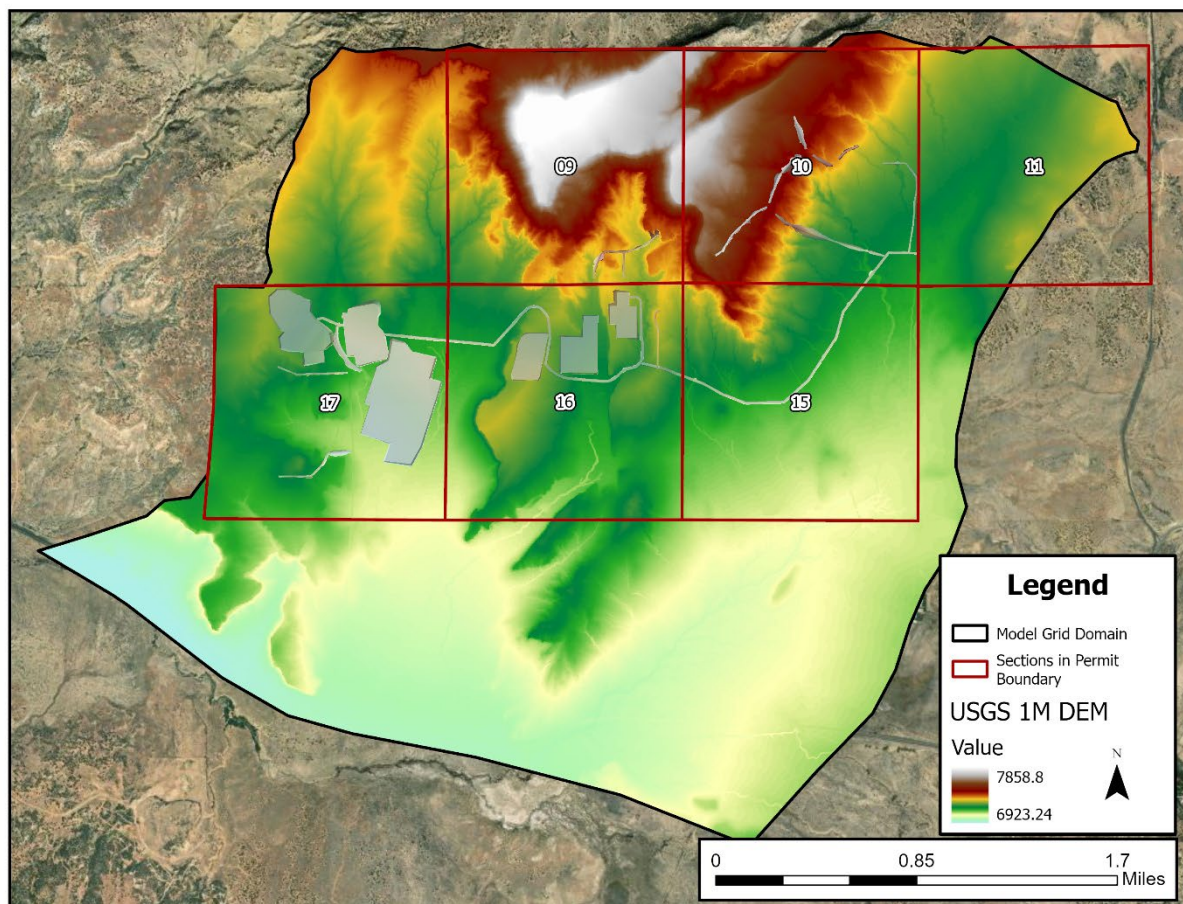


Figure 35: Proposed Facilities Surfaces

A.3.2 Rain-on-Grid Hydrograph

The 100-, 25-, 5-year 24-hour storms used in this study was developed based on precipitation estimates from NOAA Atlas 14. These depths were distributed using the alternating block storm patter, which is a stacked, hypothetical distribution that simulates the rainfall intensity for sub-durations within a 24-hour period. The hyetograph applied in the model is shown in Figure 36.

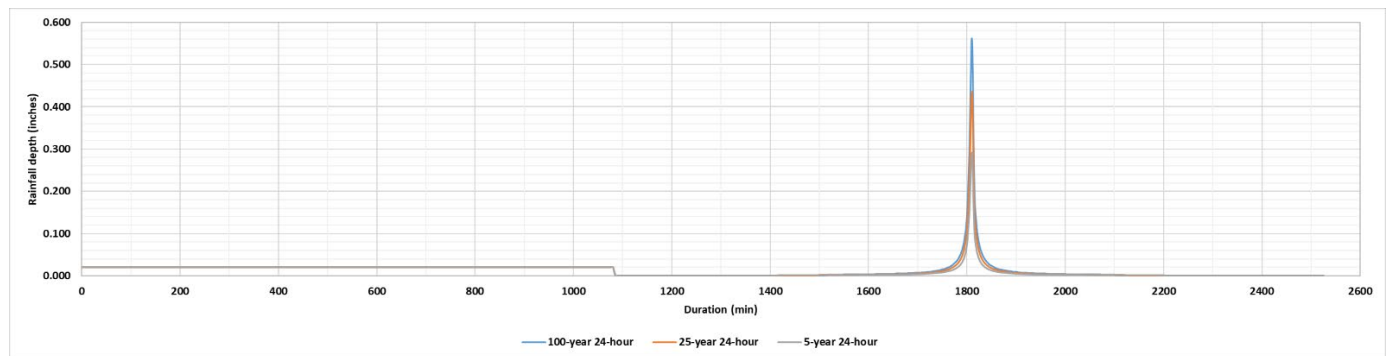


Figure 36: Rainfall Hyetograph used in the proposed conditions flood HEC-RAS model

A.3.3 Rainfall Loss

See section A.2.3 of this attachment for details on how the precipitation losses were computed.

A.3.4 Manning's Roughness

See section A.2.4 of this attachment for details on how Manning's roughness values were assigned.

A.3.5 Development of the Model Grid

Stantec set up the hydrologic model domain to encompass the entire drainage area that routes the proposed infrastructure in the project area. The model domain is made up of thousands of grid cells that represent the underlying terrain along each grid cell face. The base grid cell size used in the model was 50-ft x 50-ft. Breaklines were then used to provide better resolution of features like channels and berms that will convey or restrict water flow. The extent of the computational domain and breaklines used are illustrated in Figure 37.

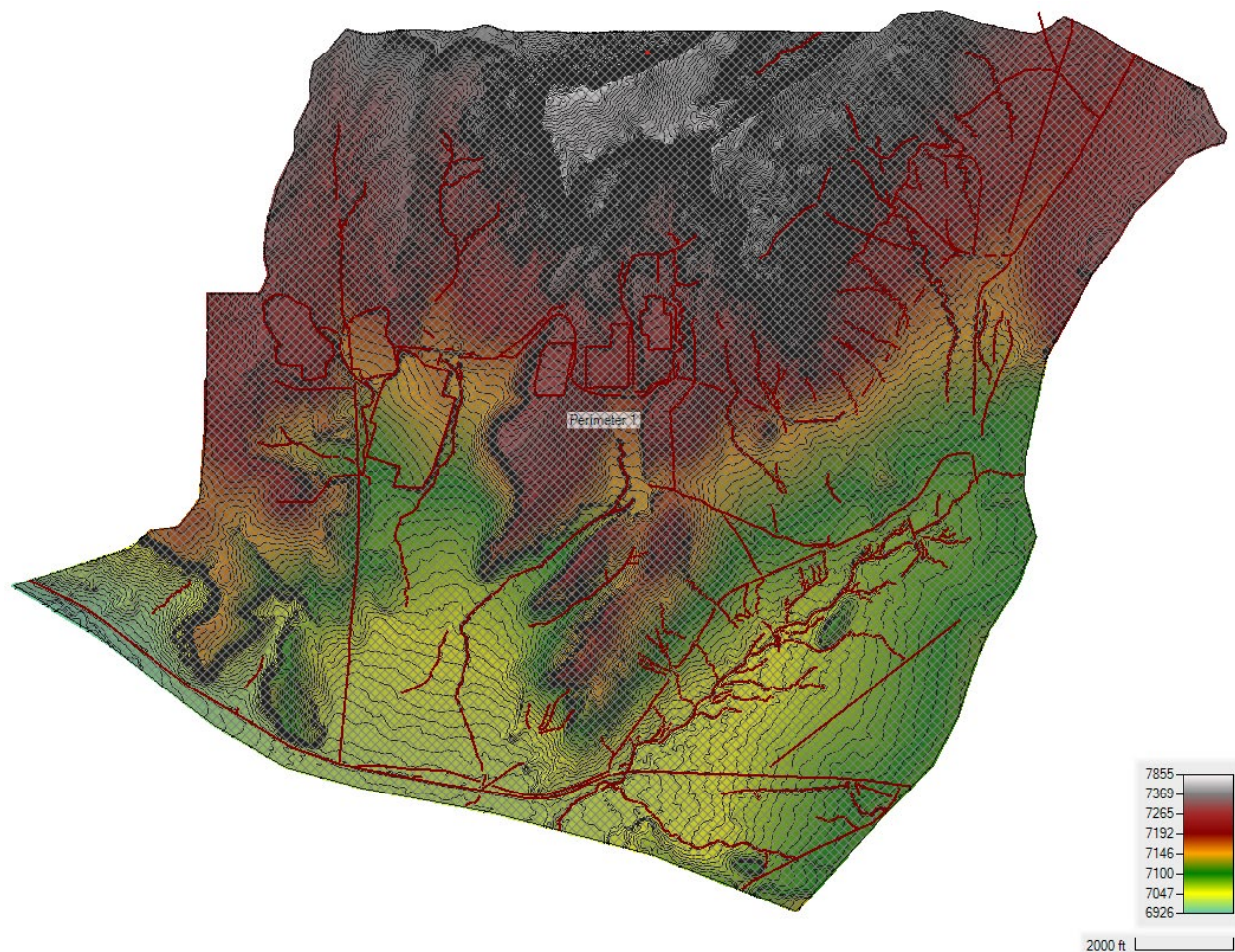


Figure 37: Model Computational Domain, Grid Cells, and Breaklines

A.3.6 Model Boundary Conditions

See section A.2.6 for details on the internal and external boundary conditions used in the model.

A.3.7 Computation Controls

See section A.2.7 for details on the computation controls used in the model.

A.3.8 Model Results

A flood map showing the hydrologic model results (maximum depth and velocity) for the 100-, 25-, 5-year storm events predicted for the model are shown in Figure 38 through Figure 43 respectively. Hazard classification following guidelines from Smith (2014) and USBR are shown in Figure 44 and Figure 45, respectively.

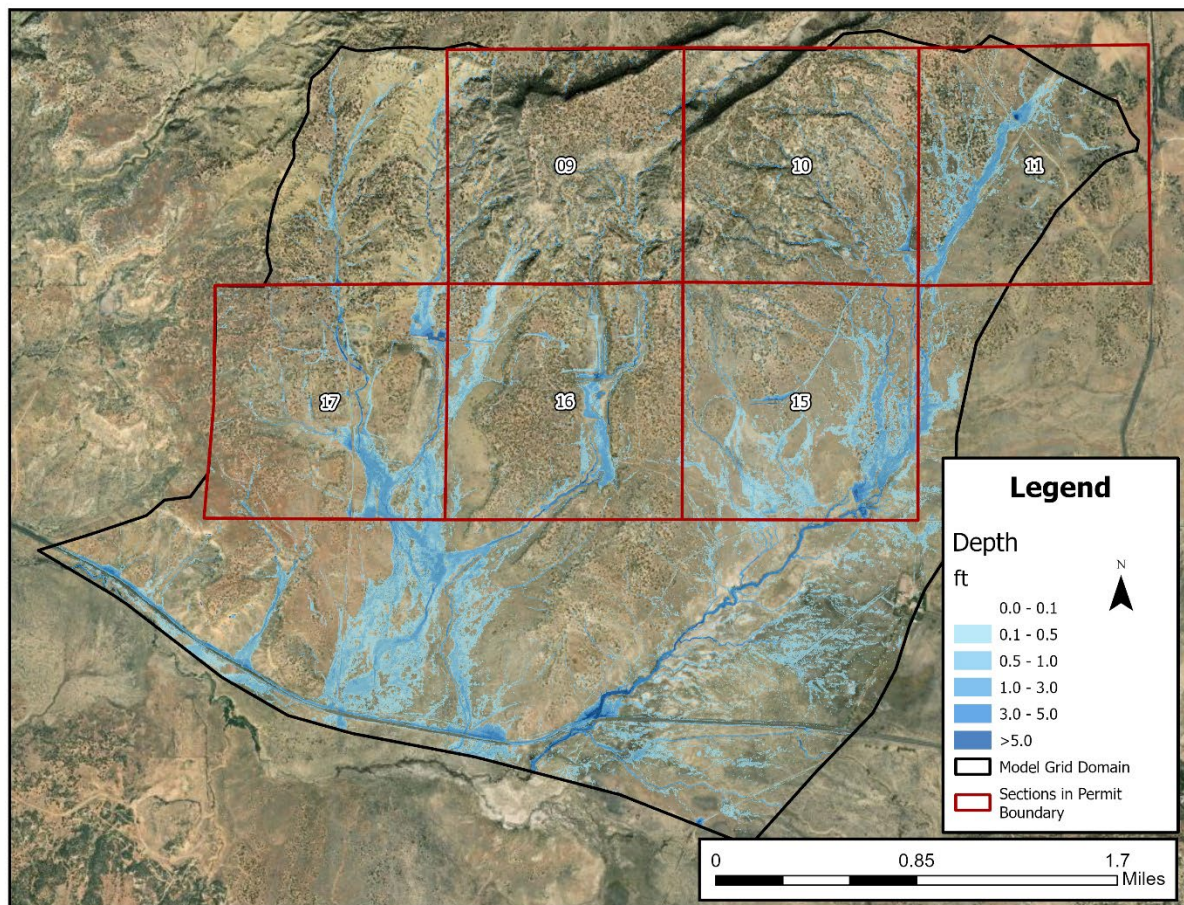


Figure 38: Flood Map with Maximum Depth for the 100-year 24-hour Storm event

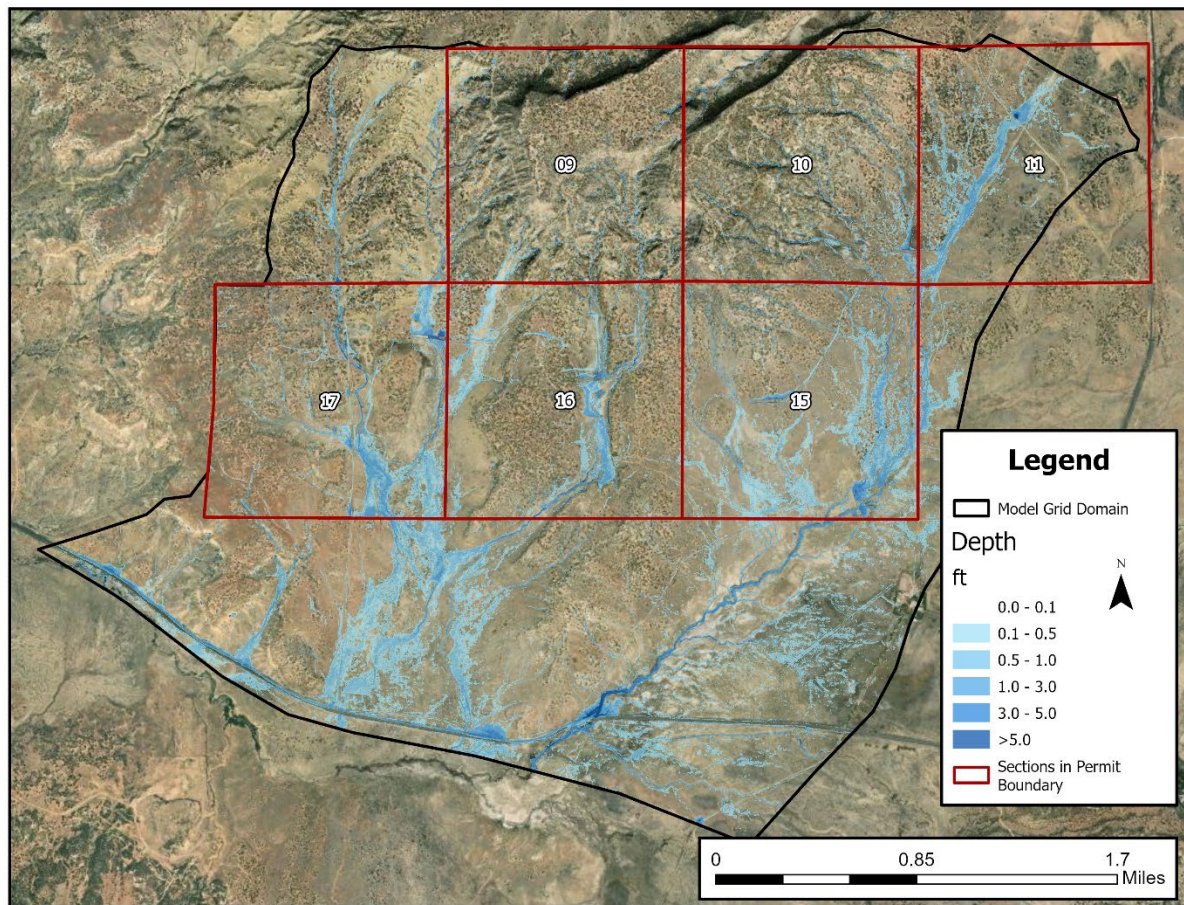


Figure 39: Flood Map with Maximum Depth for the 25-year 24-hour Storm event

Roca Honda Mine – Preliminary Surface Water Management Plan

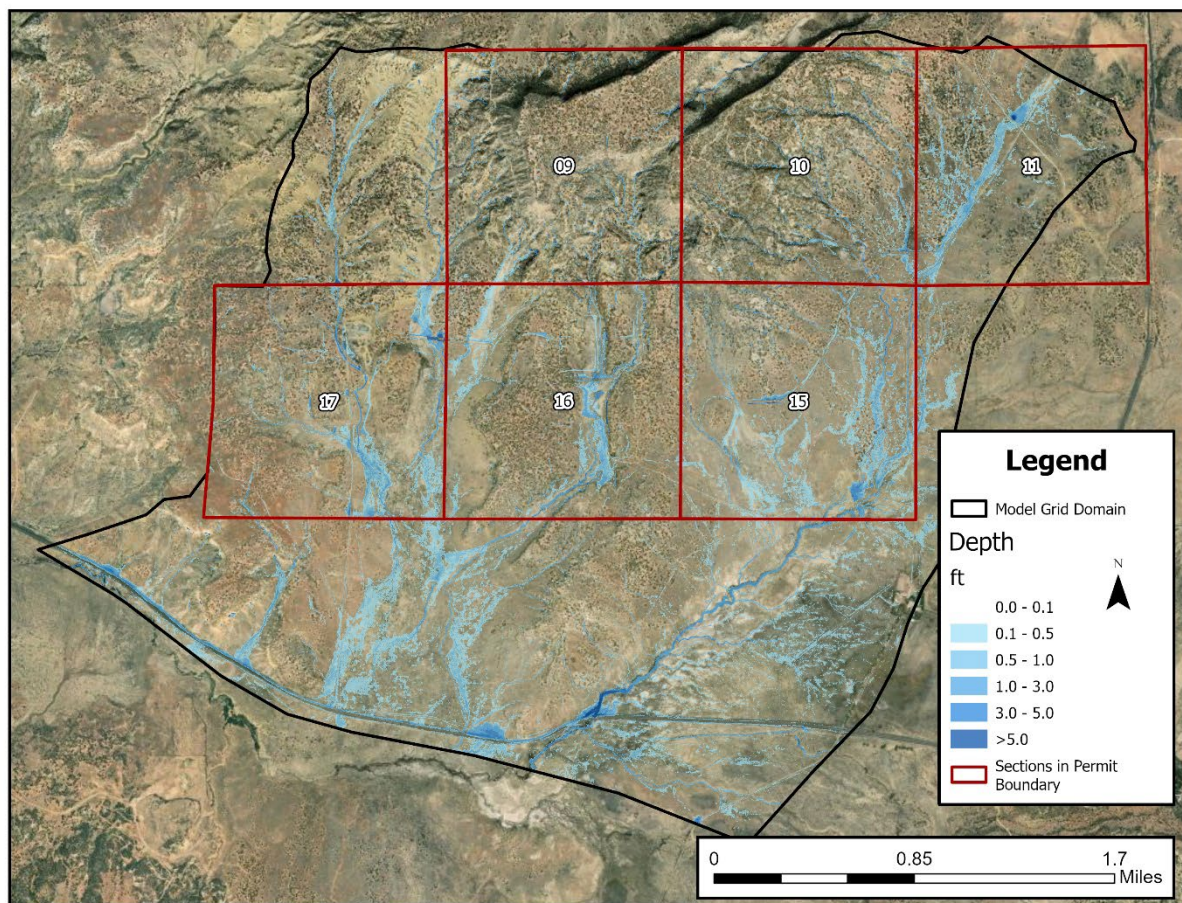


Figure 40: Flood Map with Maximum Depth for the 5-year 24-hour Storm event

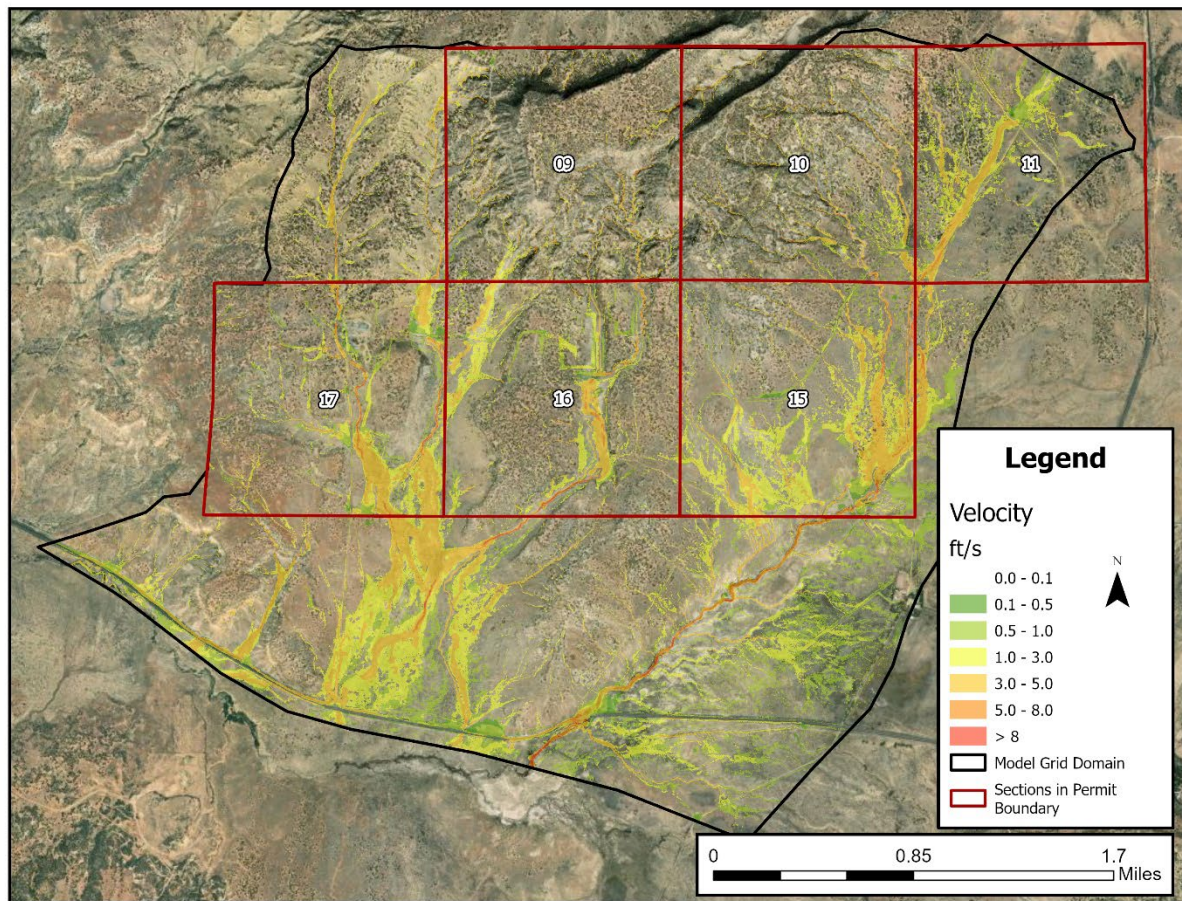


Figure 41: Flood Map with Maximum Velocity for the 100-year 24-hour Storm event

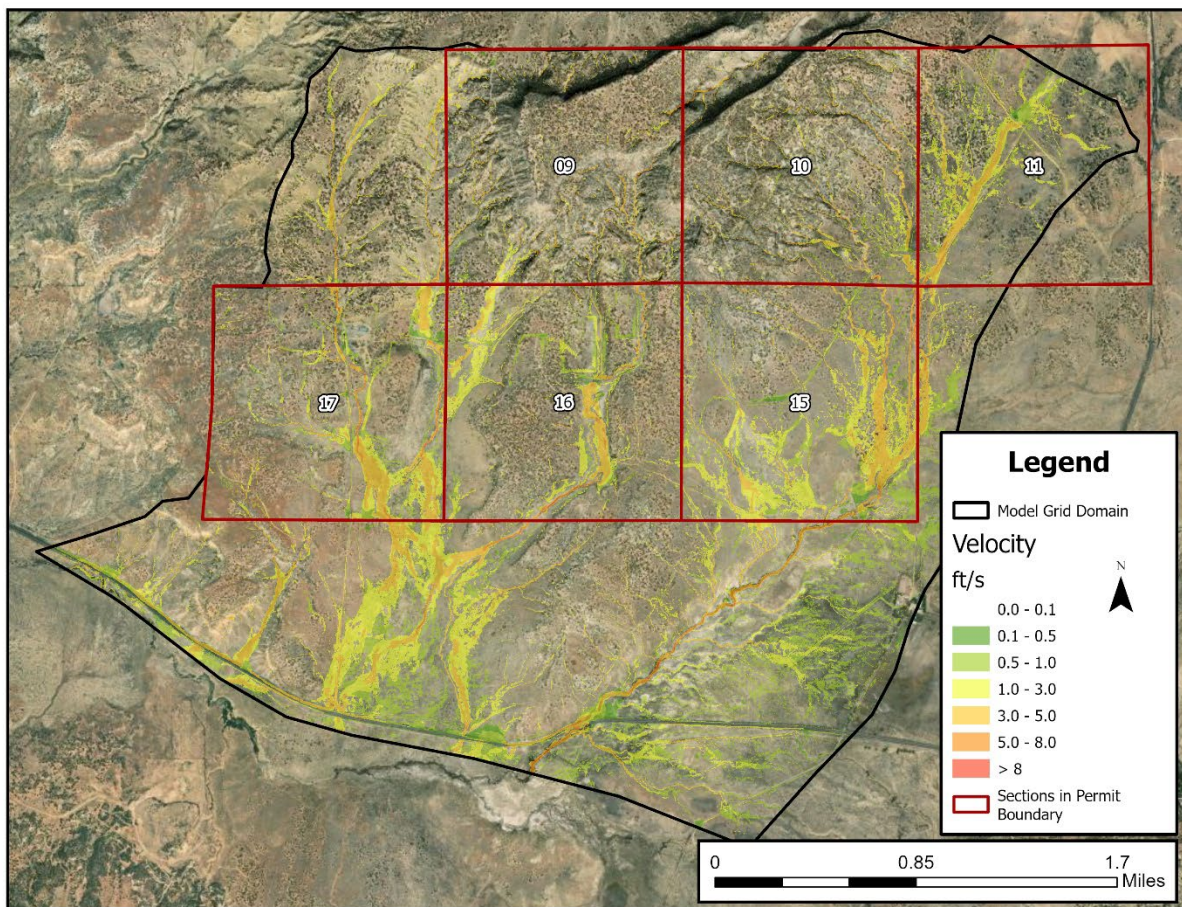


Figure 42: Flood Map with Maximum Velocity for the 25-year 24-hour Storm event

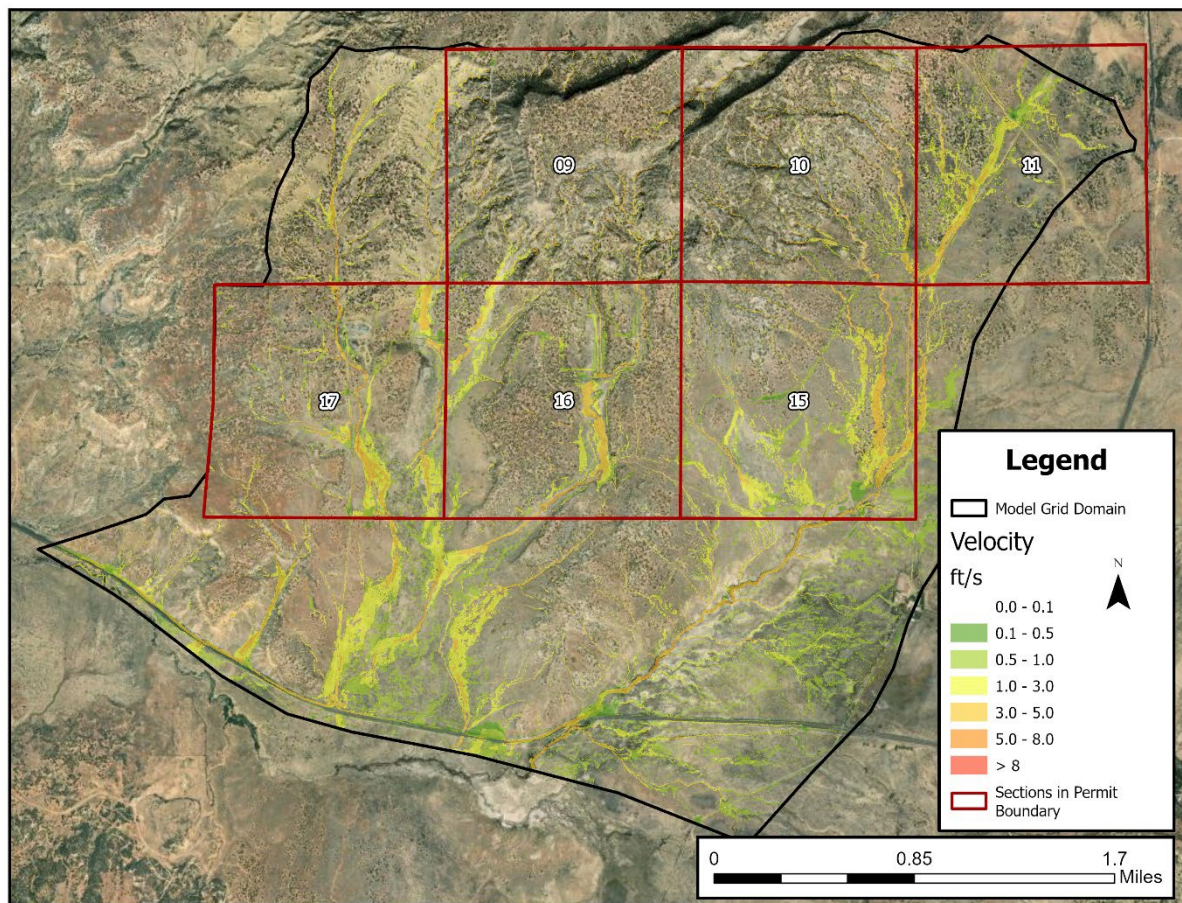


Figure 43: Flood Map with Maximum Velocity for the 5-year 24-hour Storm event

Roca Honda Mine – Preliminary Surface Water Management Plan

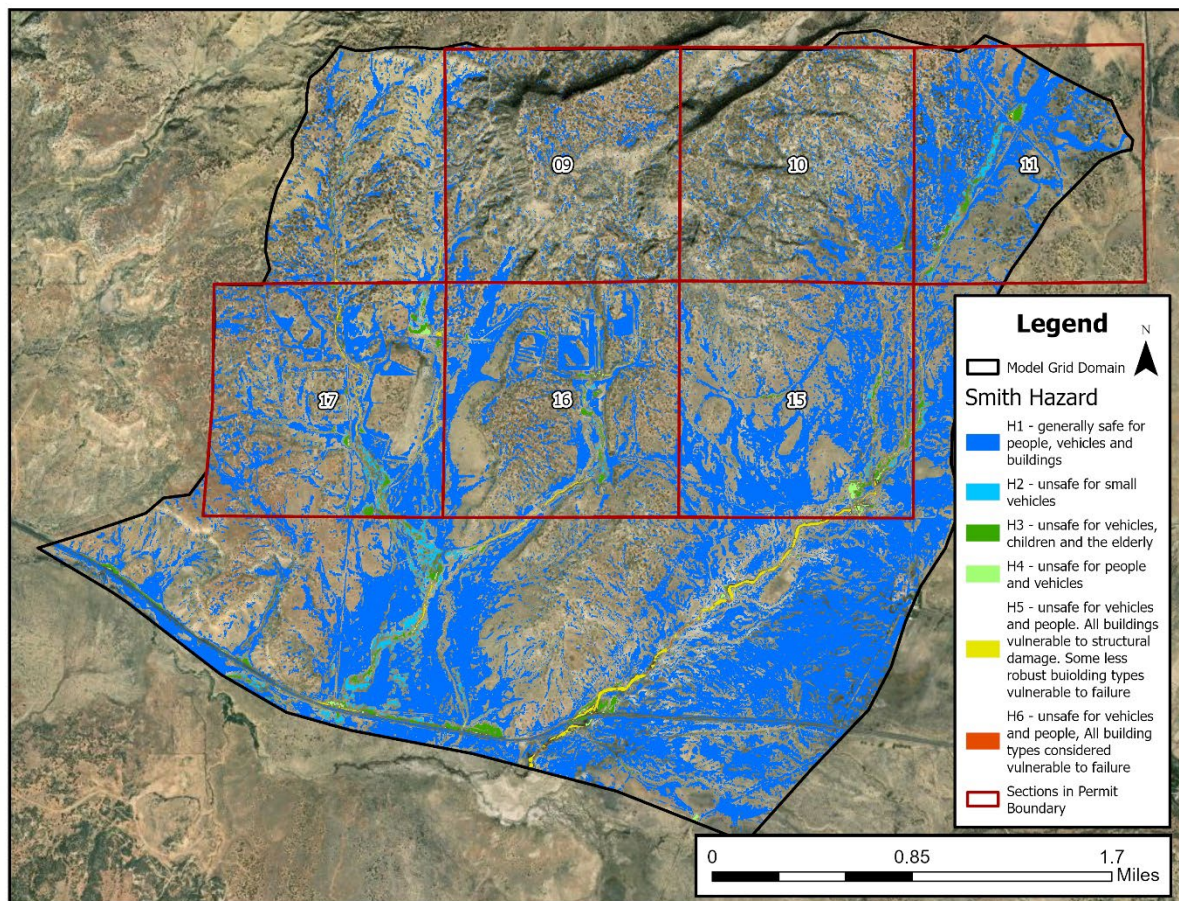


Figure 44: Flood Hazard Map Following Smith et. al Classifications (G P Smith, 2014)

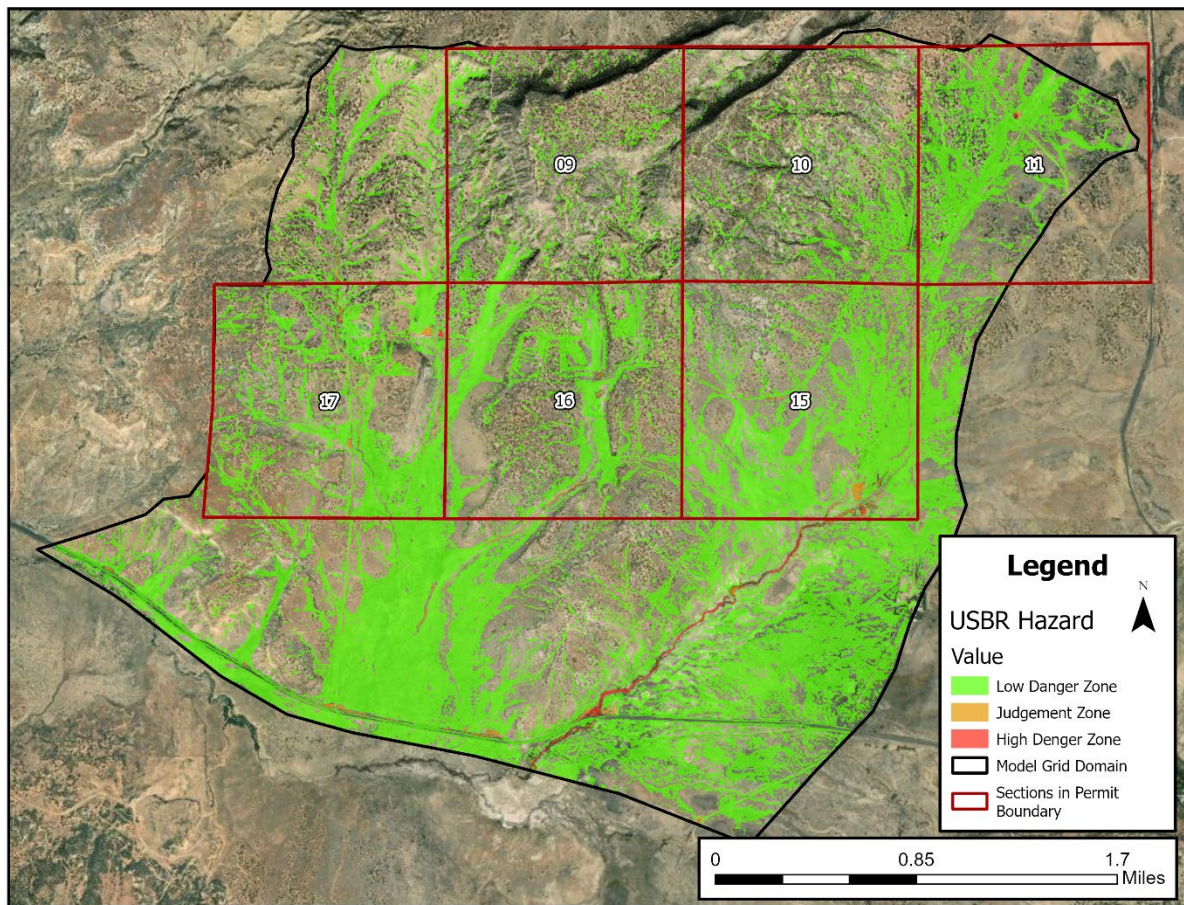


Figure 45: Flood Hazard Map Following USBR Classifications (USBR, 1988)

A.4 References

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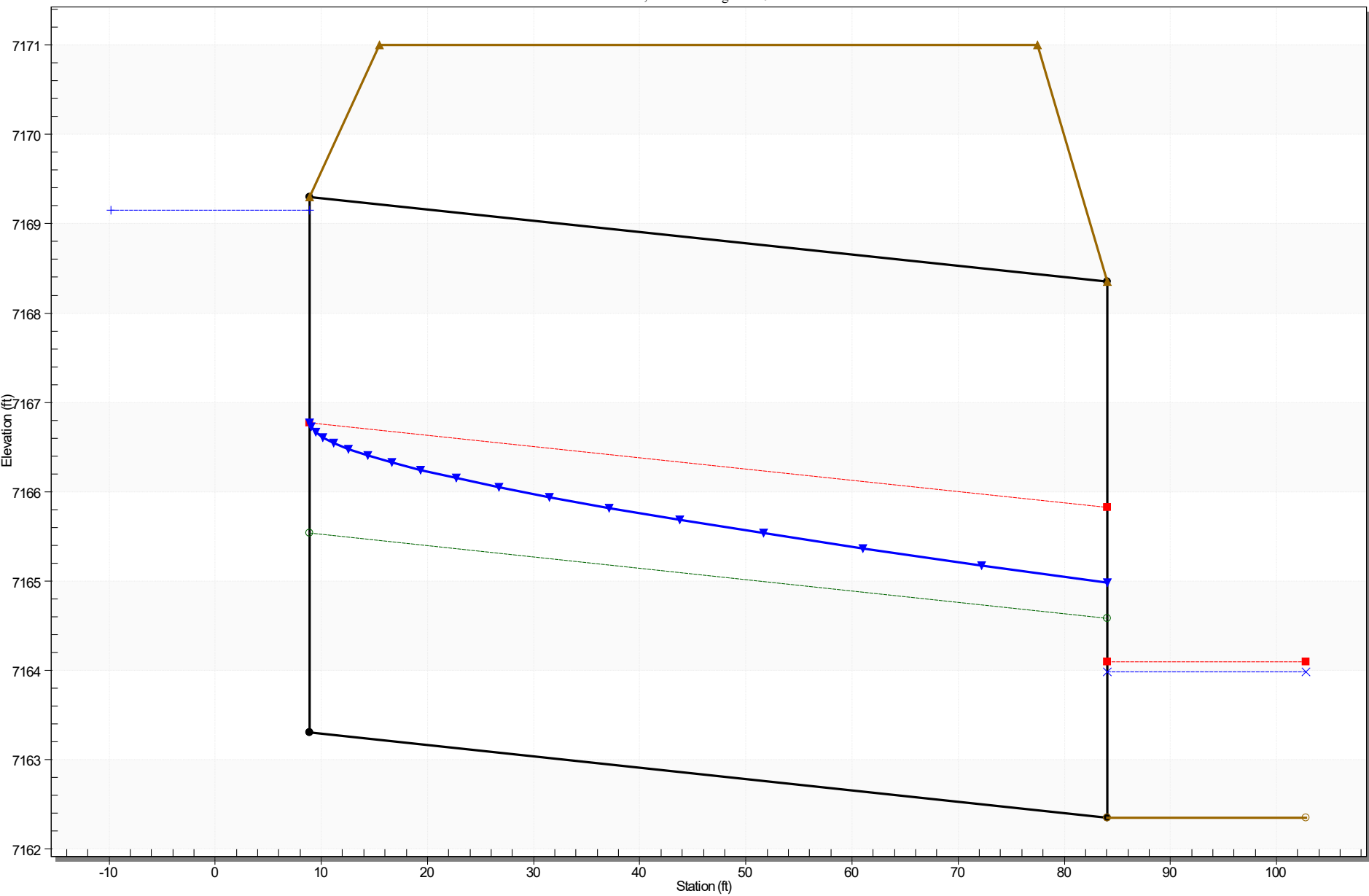
Attachment B - Supporting Calculations

Water Volume Calculations							
Pad	Description	Area (ft2)	100-year 24-hour Precipitation Depth, P (in)	Runoff Coefficient, C (-)	Water Volume (ft3)	Sediment Volume (ft3)	Total Retention Volume Required (ft3)
1	Sec 17 Stockpile Pad	1519950	2.43	0.915	281,628	6,999	288,627
2a/2b	Sec 17 Shaft Pad	876700	2.43	0.915	162,442	1,659	164,101
3a	Sec 16 Stockpile Pad 1	684160	2.43	0.915	126,766	1,216	127,982
3b	Sec 16 Stockpile Pad 2	886583	2.43	0.915	164,273	1,555	165,828
5	Sec 16 Shaft Pad	562209	2.43	0.915	104,170	752	104,923

Sediment Volume Calculations							
Pad	Description	Rainfall Erosivity Factor, R	Soil Erodibility Factor, K (tons/acre)	Slope Length-Steepness Factor, LS (-)	Cropping-Management Factor, C (-)	Conservation Support Practice Factor, P (-)	Total Soil Loss, A (ft3)
1	Sec 17 Stockpile Pad	19.55	0.27	2.09	1	1	6998.57
2a/2b	Sec 17 Shaft Pad	19.55	0.27	0.86	1	1	1658.60
3a	Sec 16 Stockpile Pad 1	19.55	0.27	0.81	1	1	1215.53
3b	Sec 16 Stockpile Pad 2	19.55	0.27	0.80	1	1	1554.66
5	Sec 16 Shaft Pad	19.55	0.27	0.61	1	1	752.32

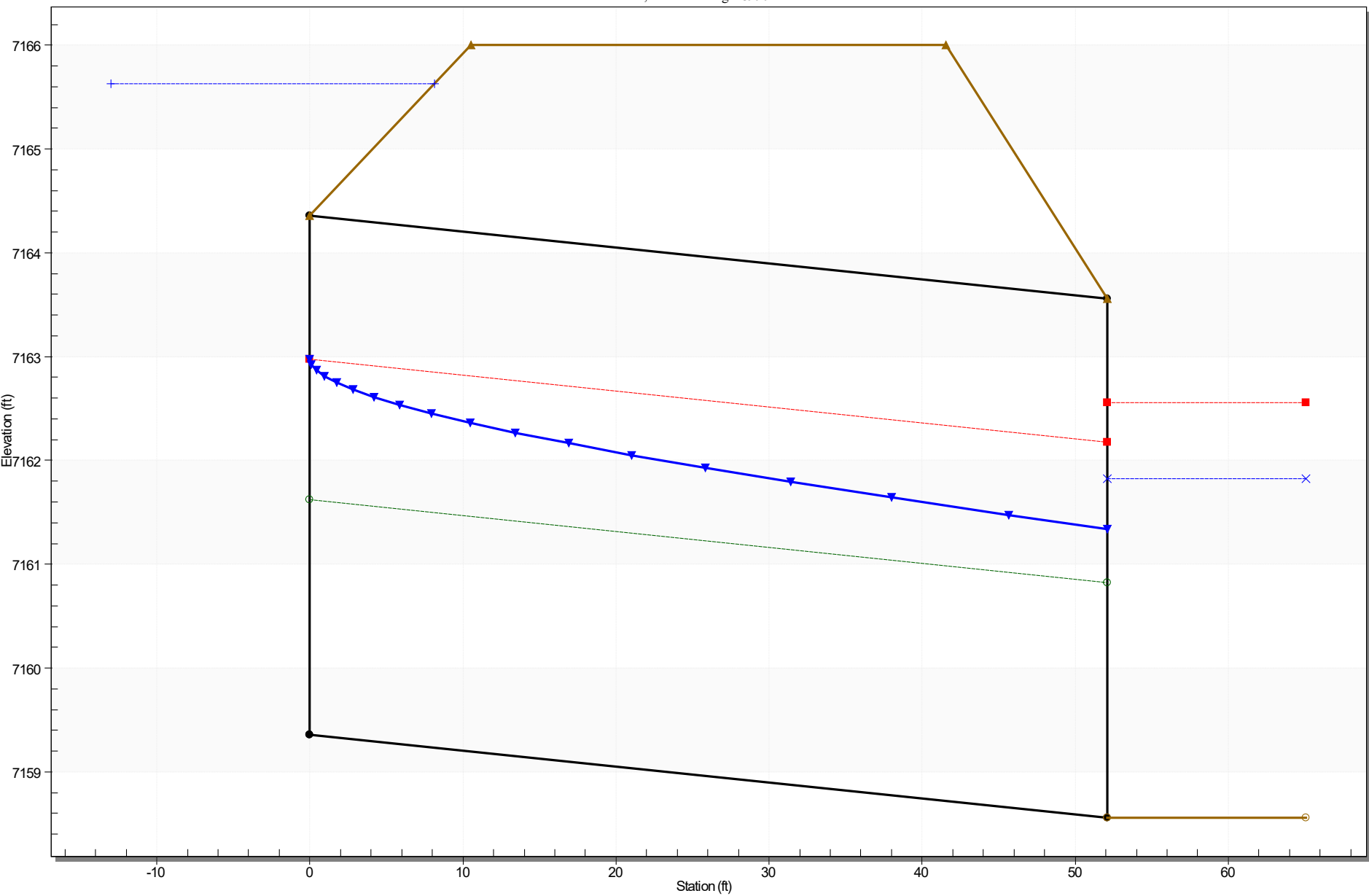
Pad	Length (ft)	Slope (ft/ft)	LS Factor
1	1549	0.05	2.09
2a/2b	801	0.03	0.86
3a	1147	0.023	0.81
3b	1117	0.023	0.80
5	960	0.02	0.61

Crossing - Culvert #1, Design Discharge - 441.0 cfs
Culvert - Culvert 1, Culvert Discharge - 441.0 cfs

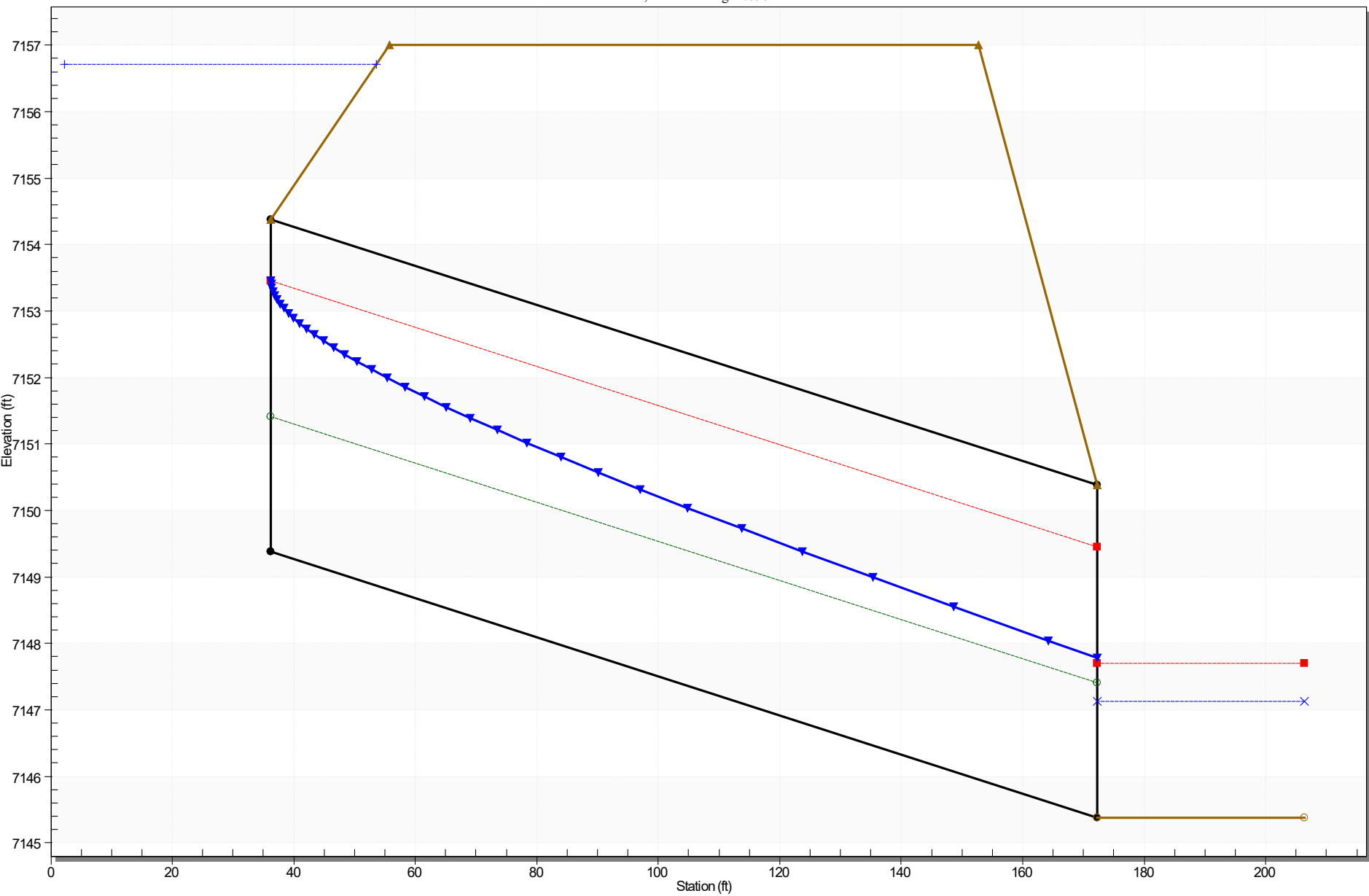


Crossing - Culvert #2, Design Discharge - 390.0 cfs

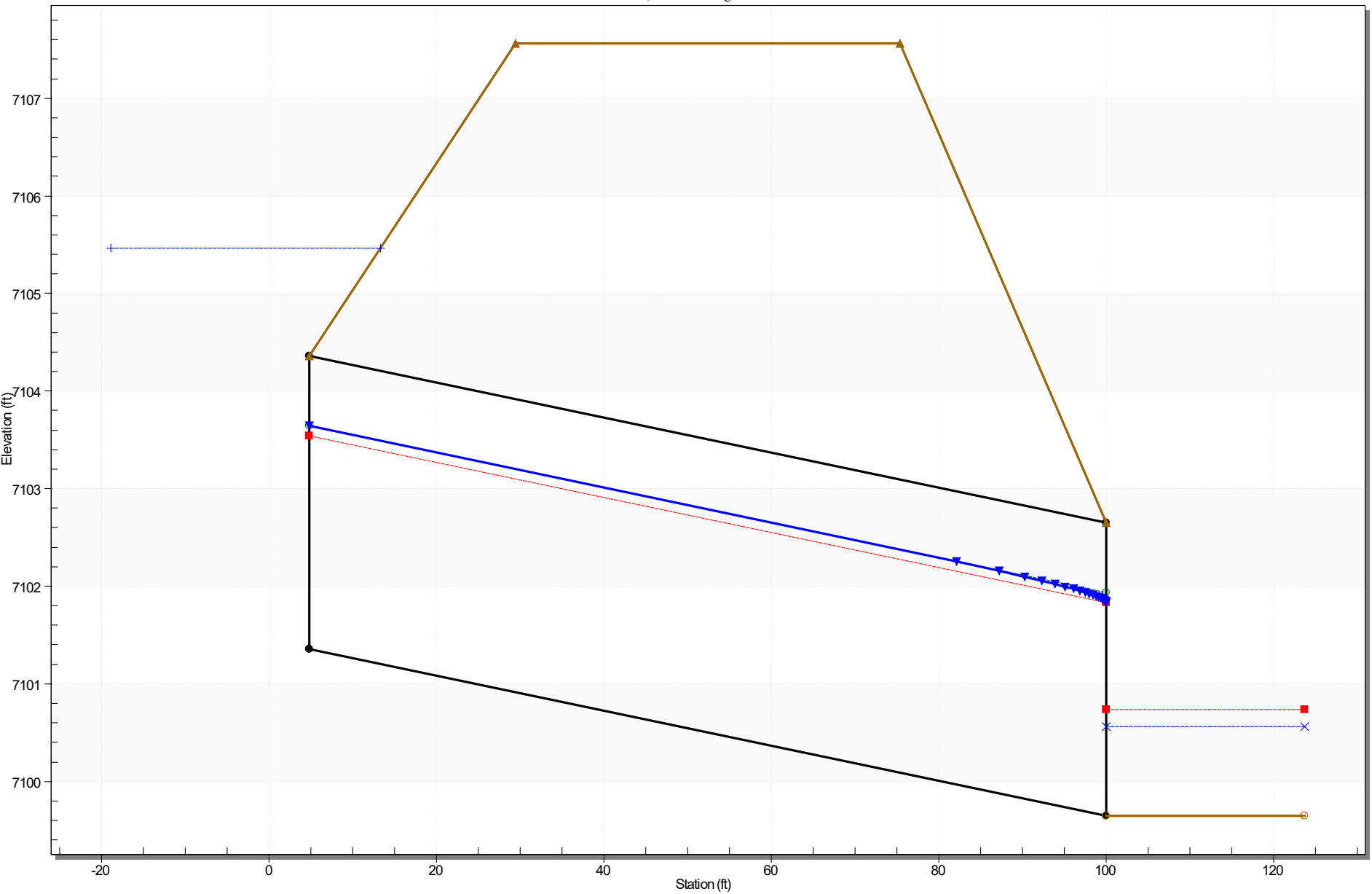
Culvert - Culvert 1, Culvert Discharge - 390.0 cfs



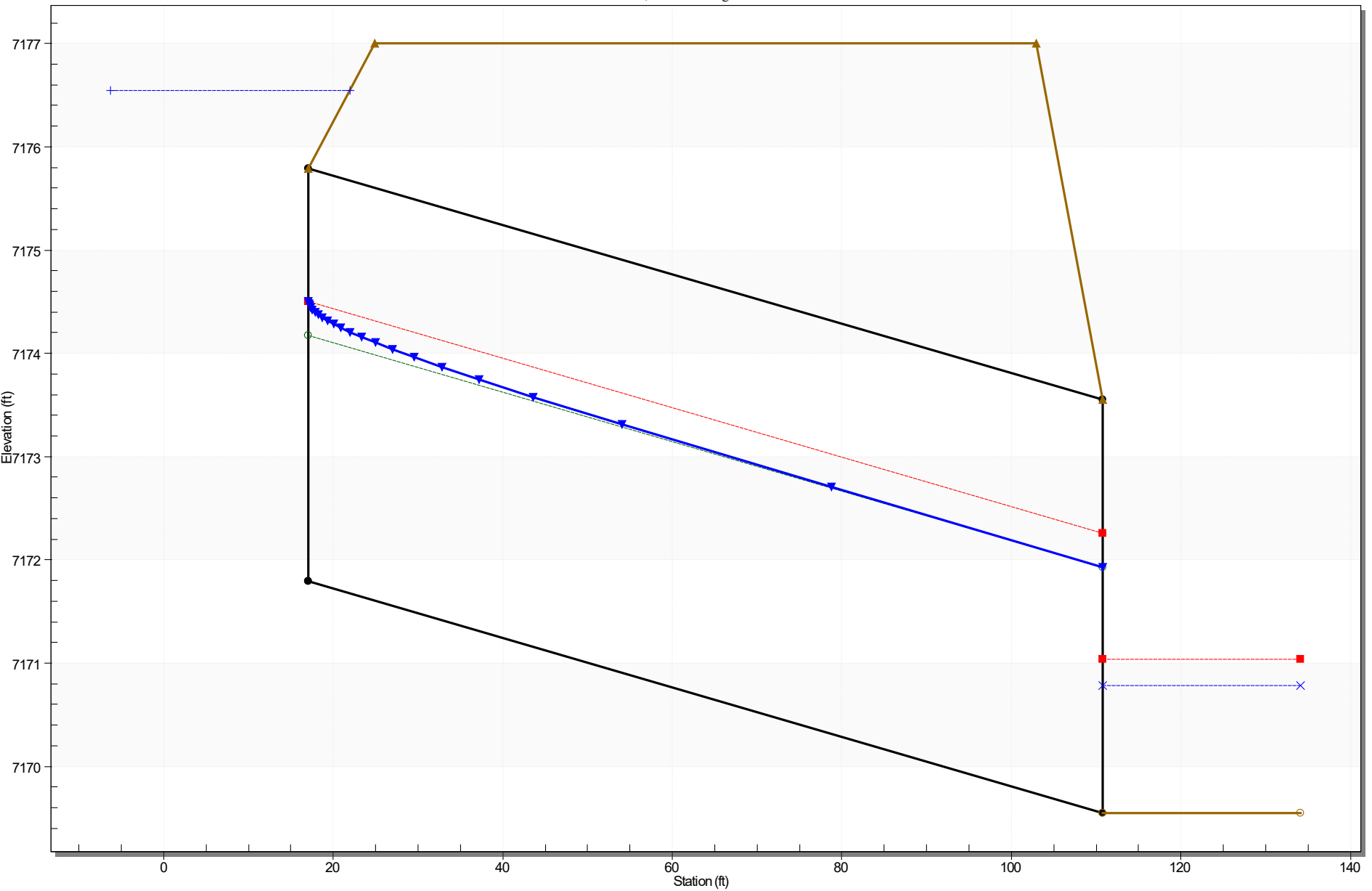
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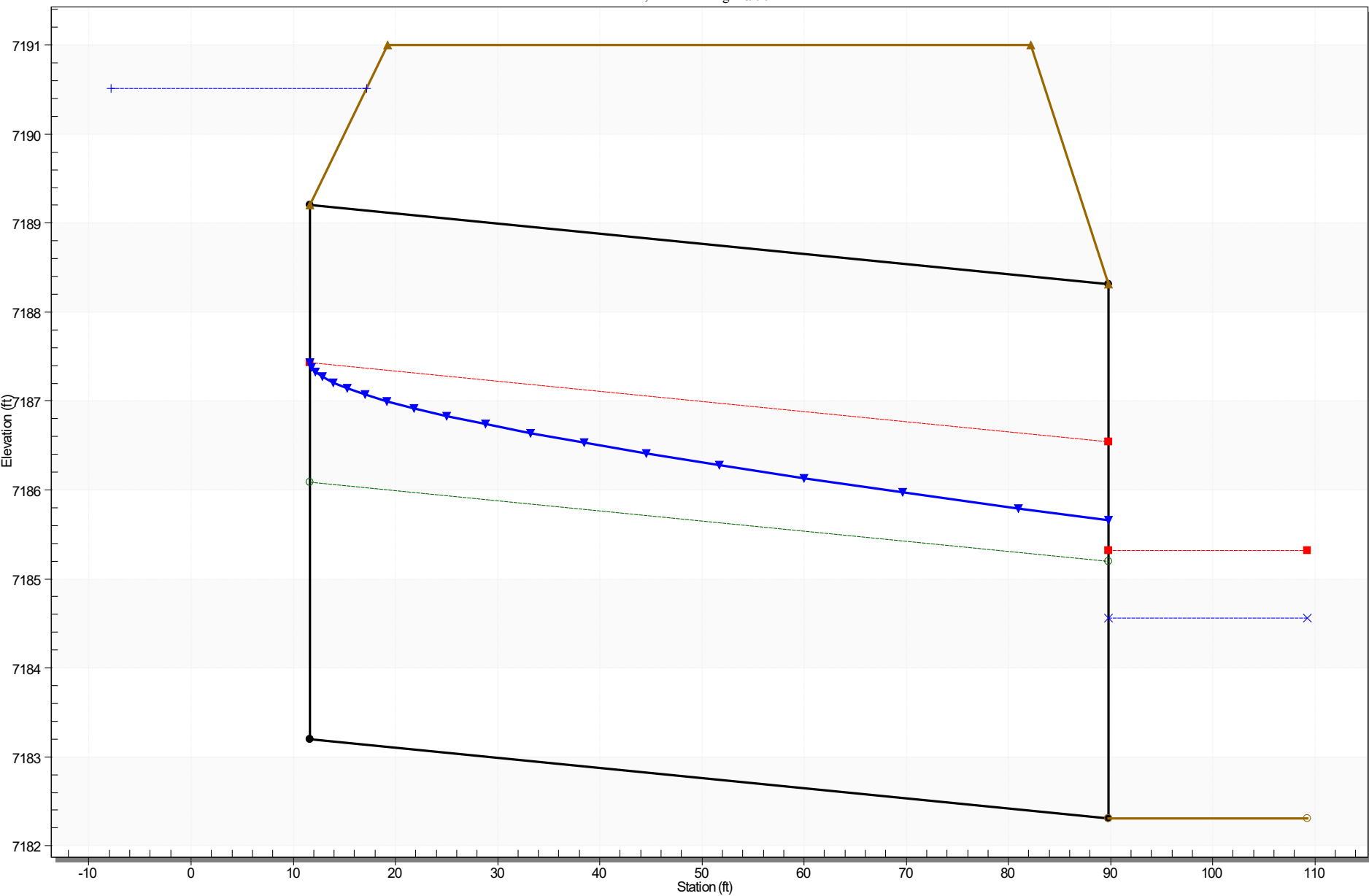
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Culvert - Culvert 1, Culvert Discharge - 45.0 cfs



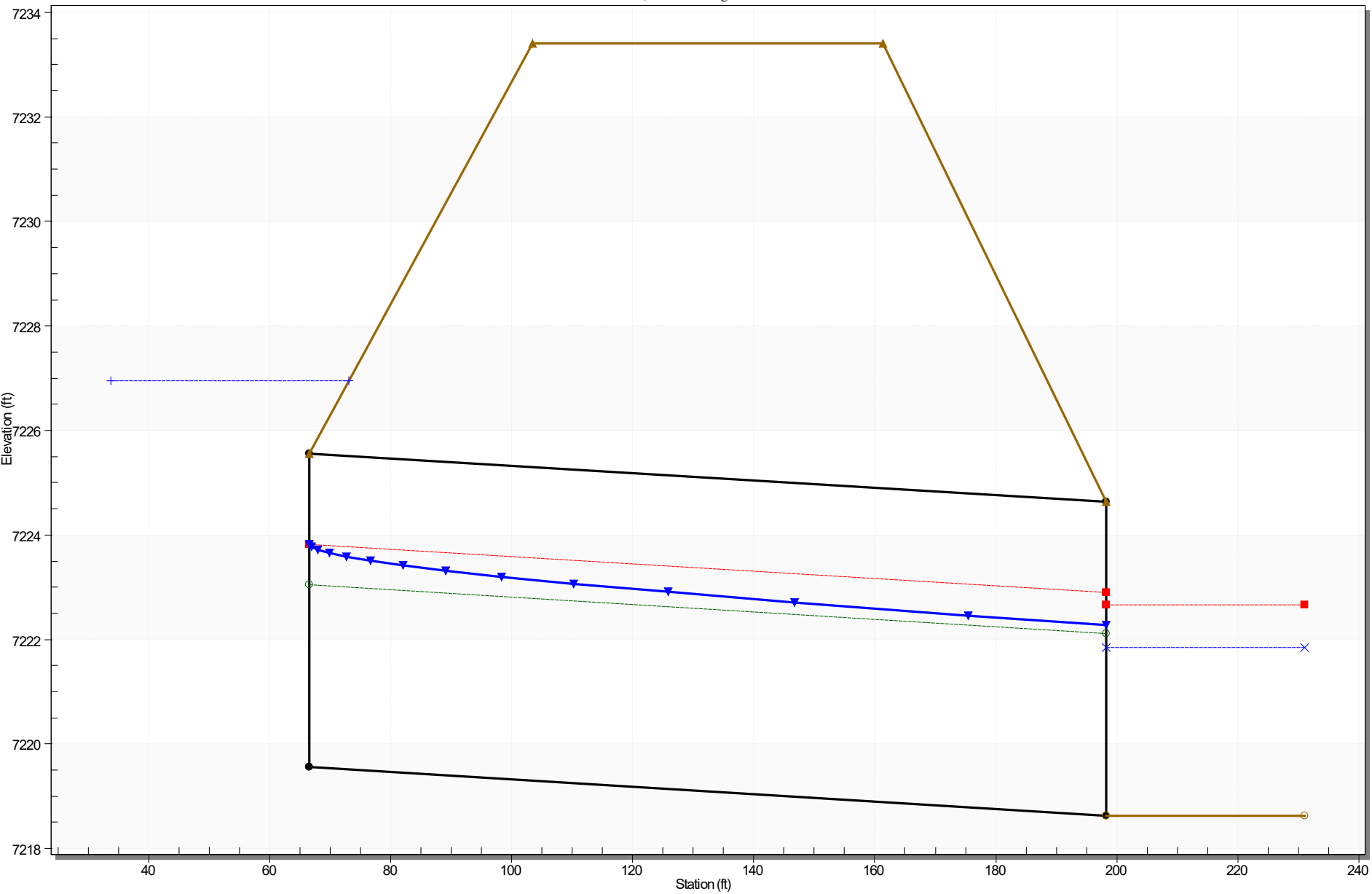
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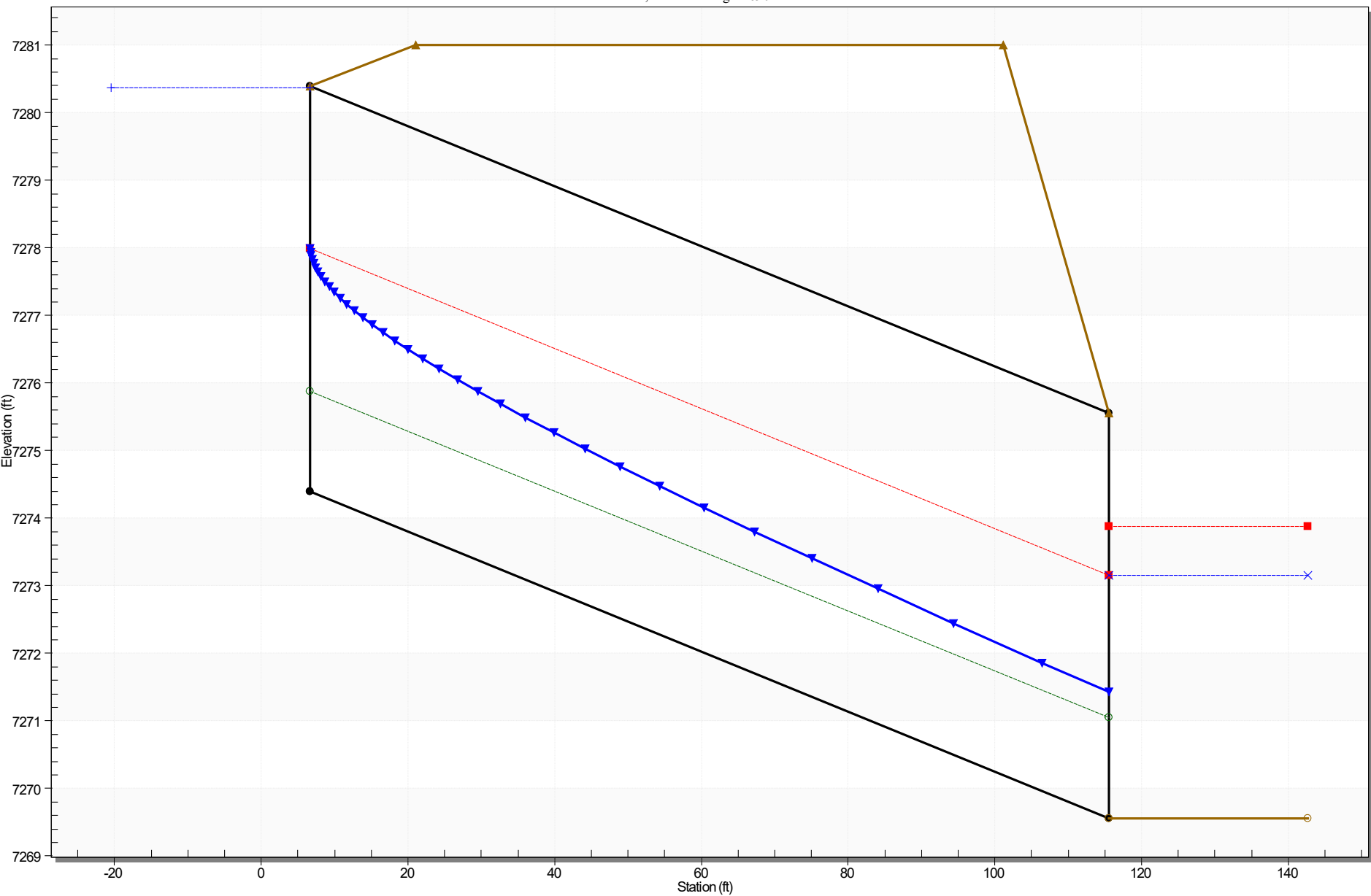
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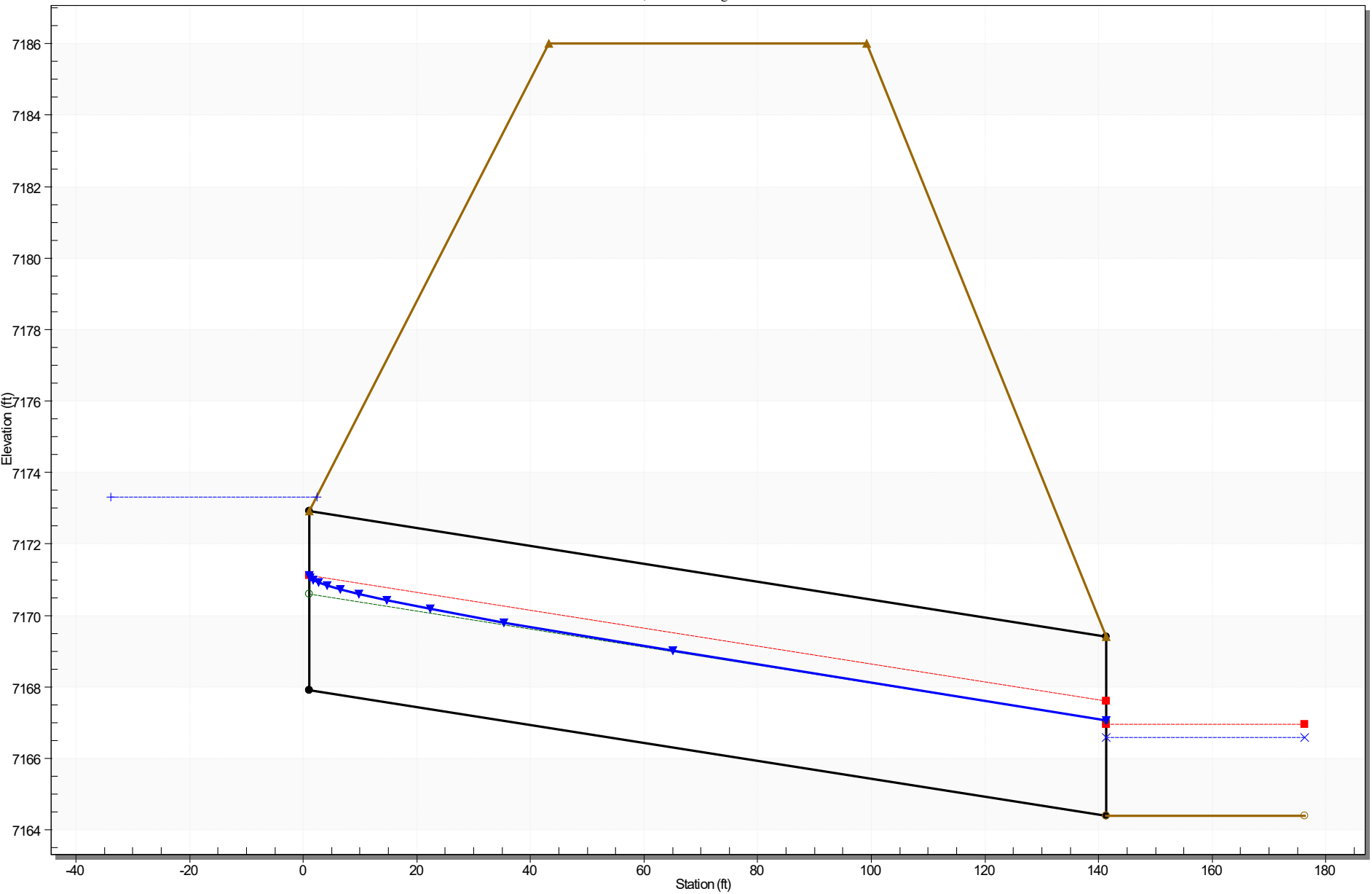
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Culvert - Culvert 1, Culvert Discharge - 600.0 cfs



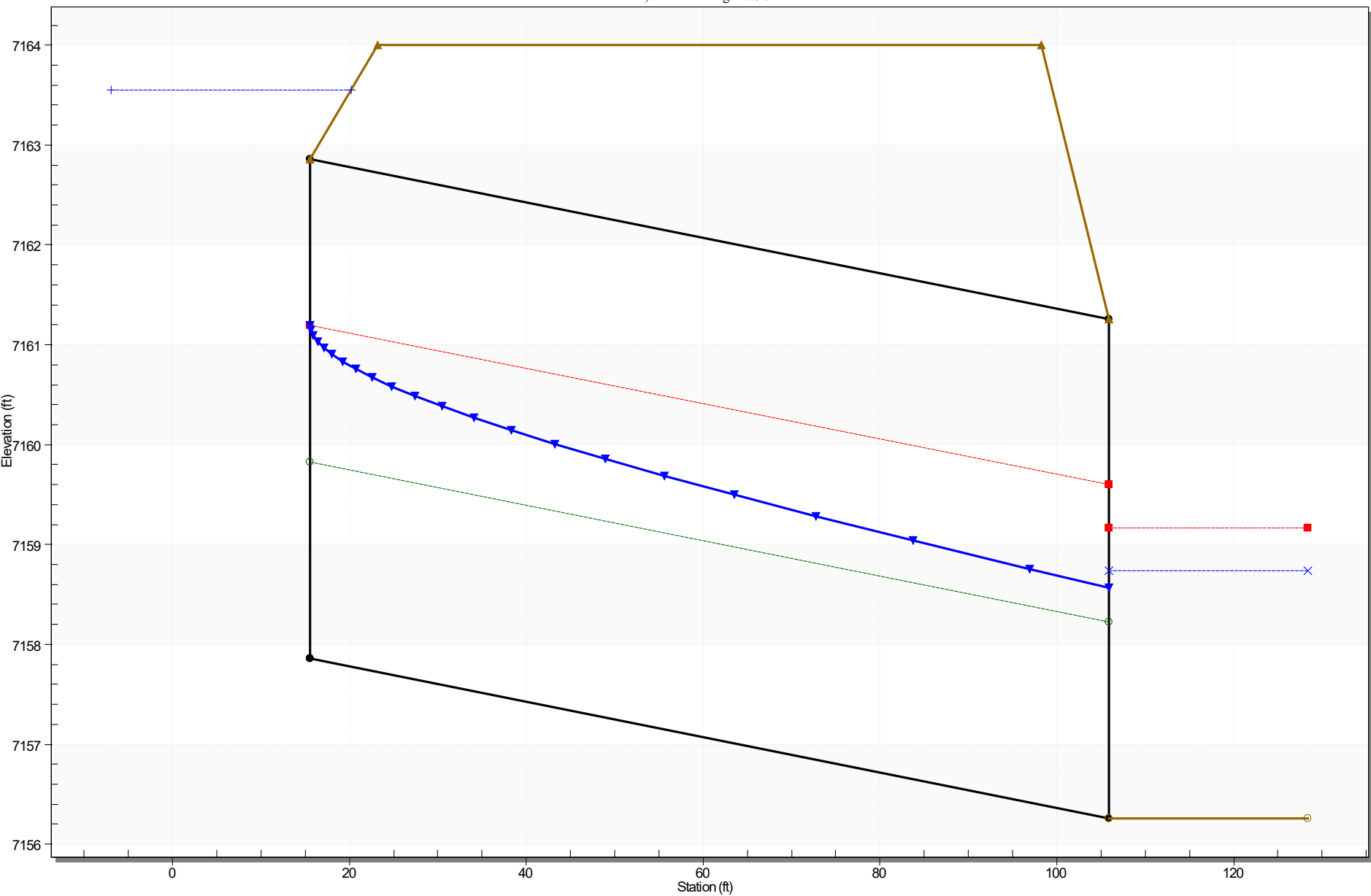
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Crossing - Culvert #9, Design Discharge - 125.0 cfs
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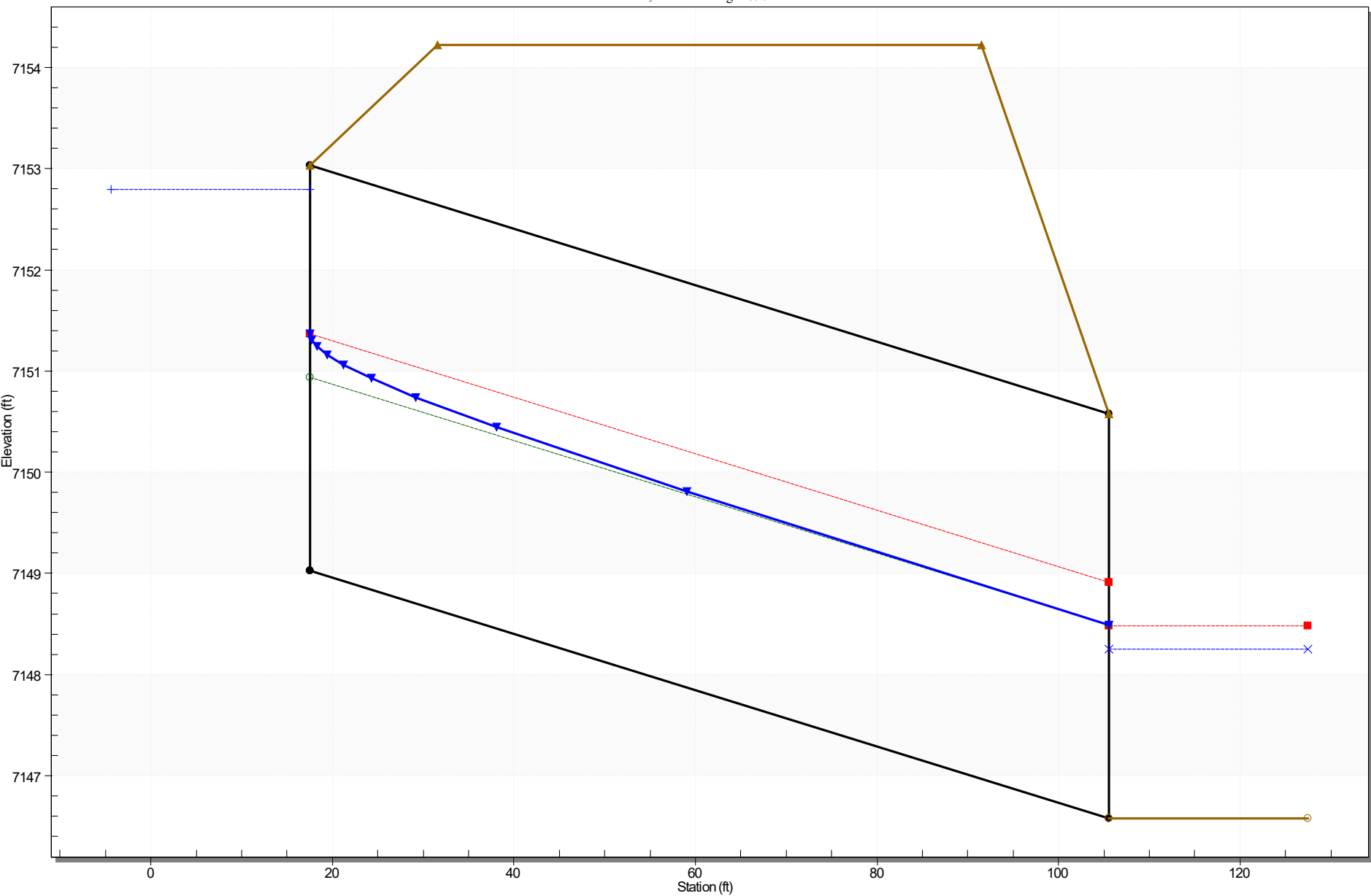


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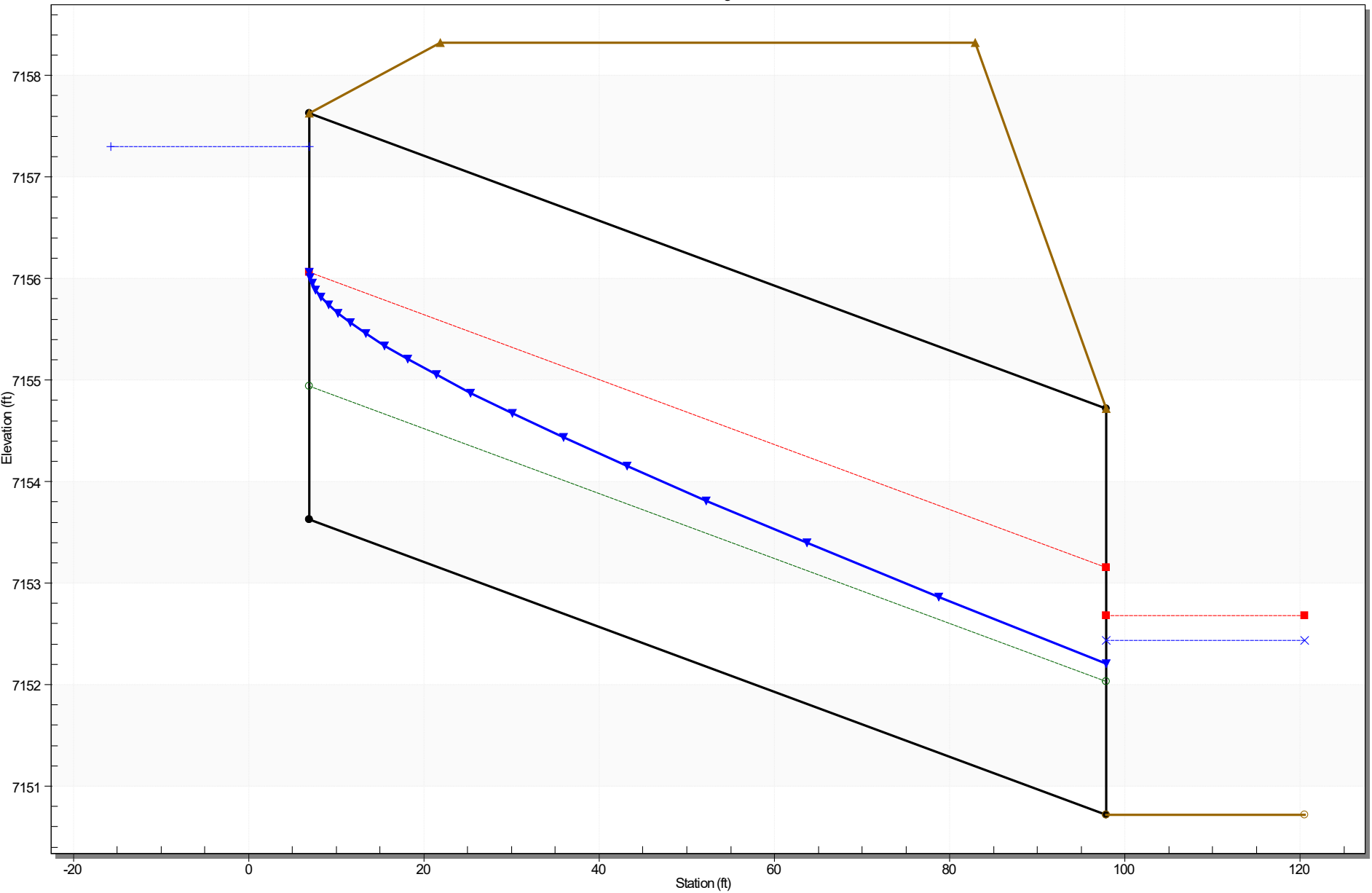


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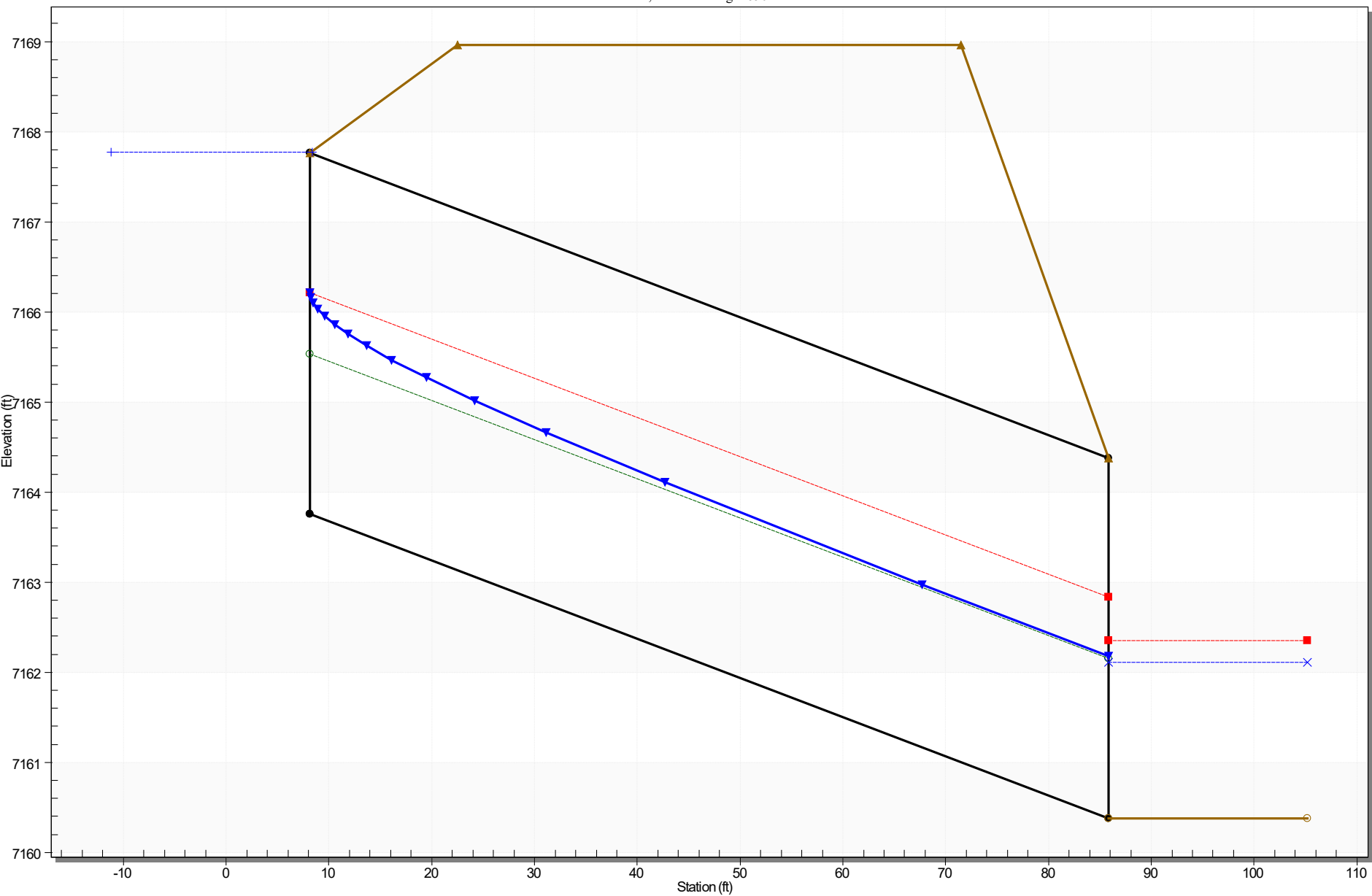
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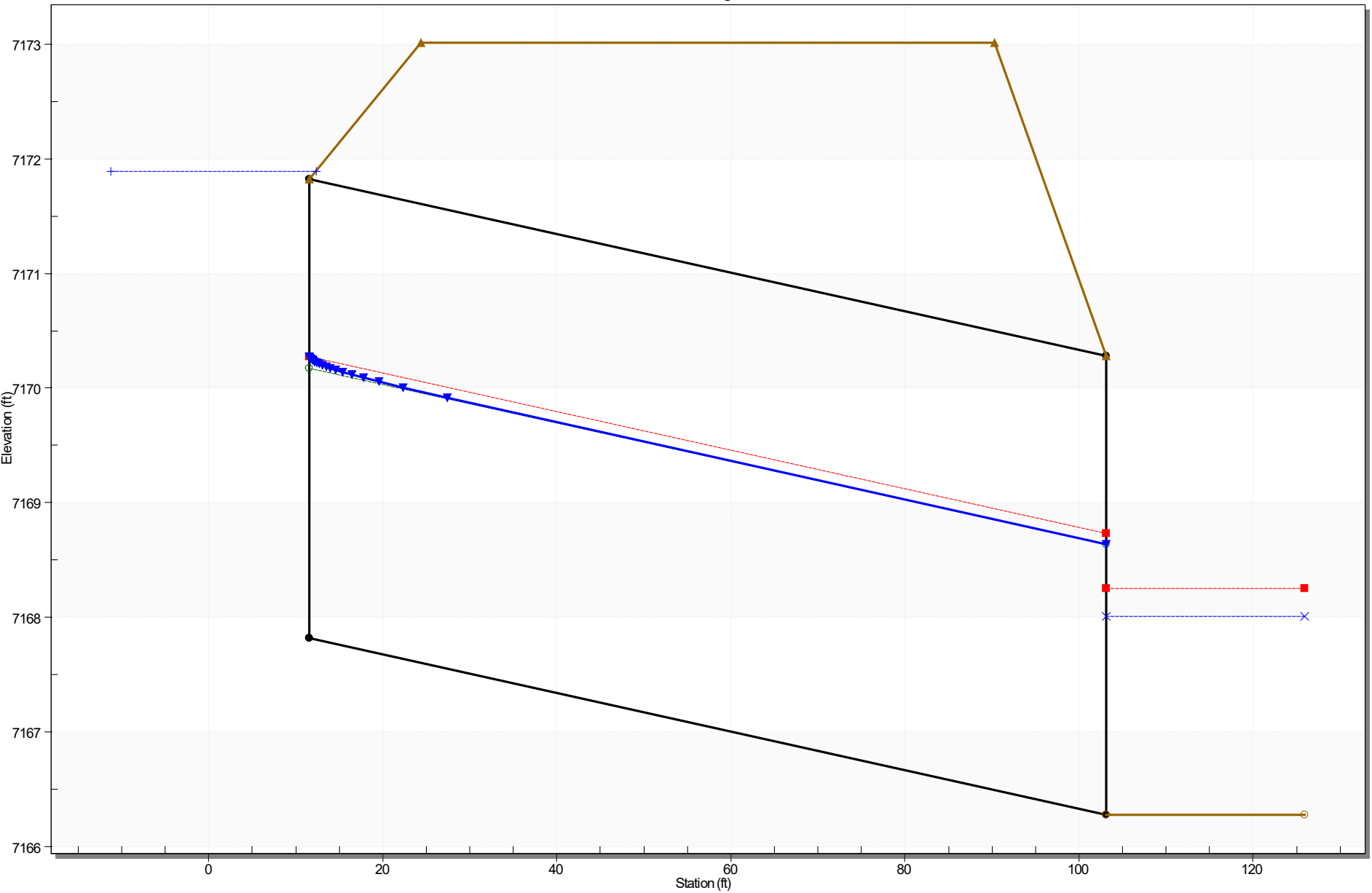
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Culvert - Culvert 1, Culvert Discharge - 66.0 cfs

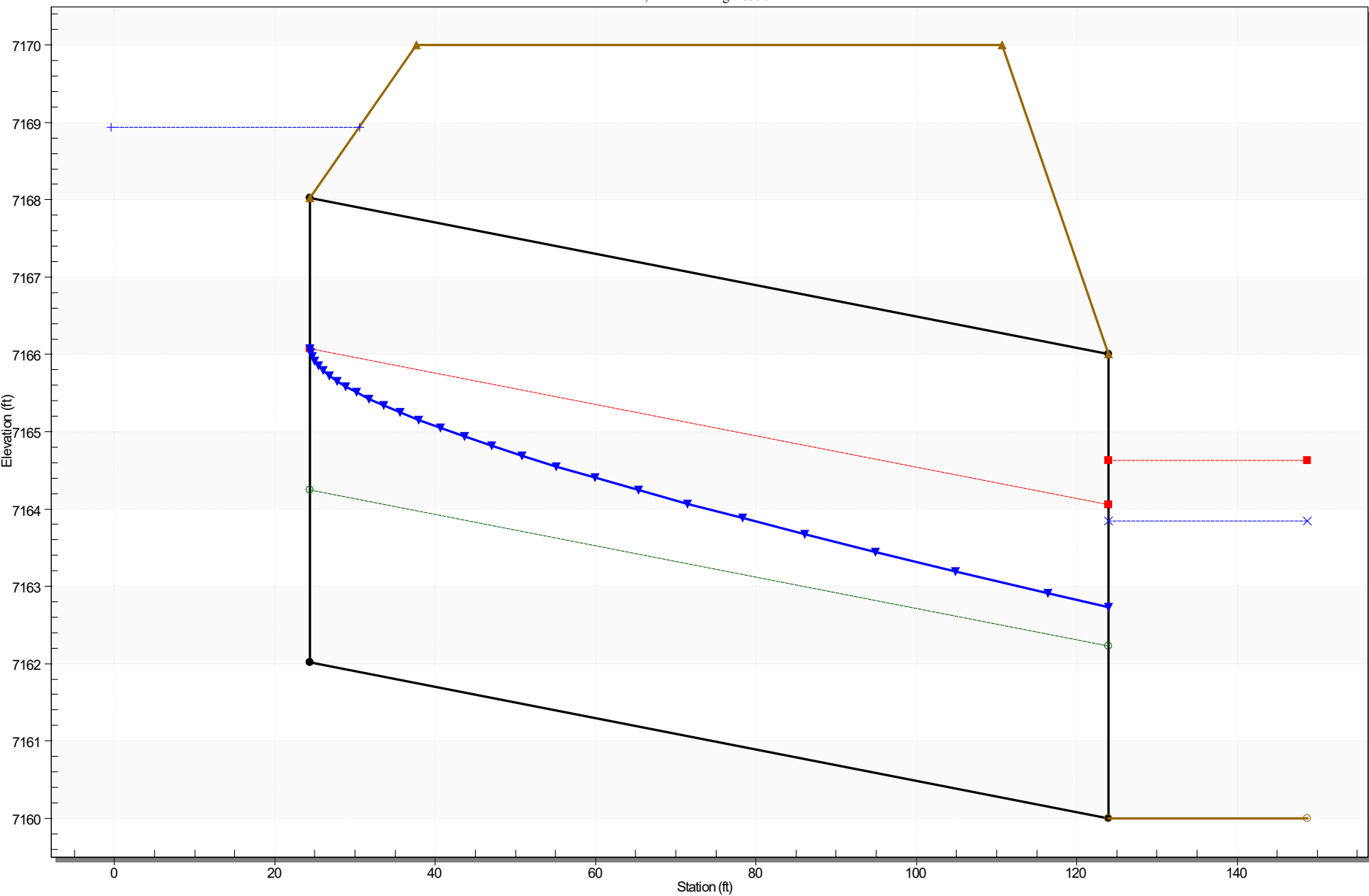


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Culvert - Culvert 1, Culvert Discharge - 66.0 cfs



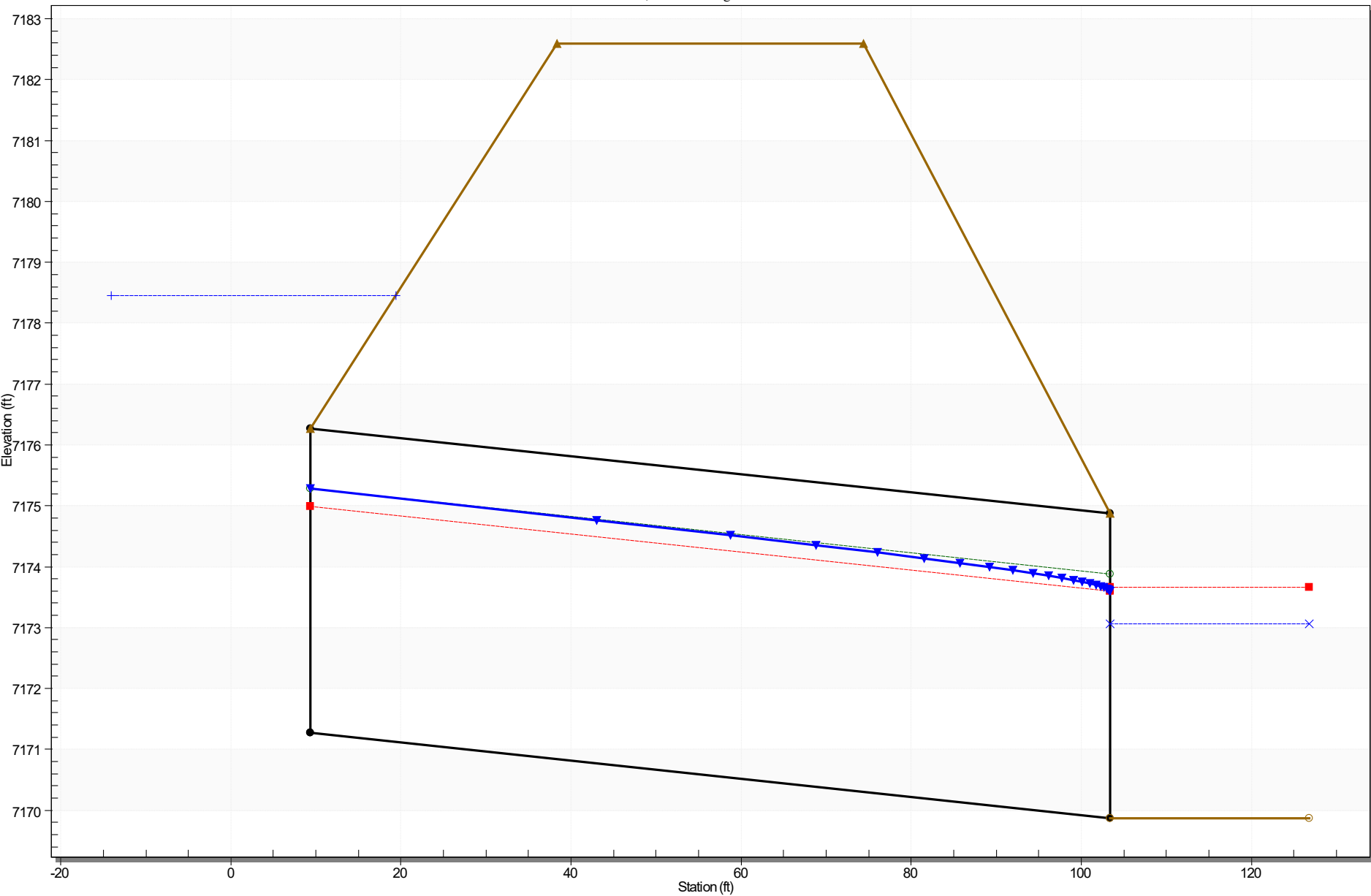
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Culvert - Culvert 1, Culvert Discharge - 556.0 cfs



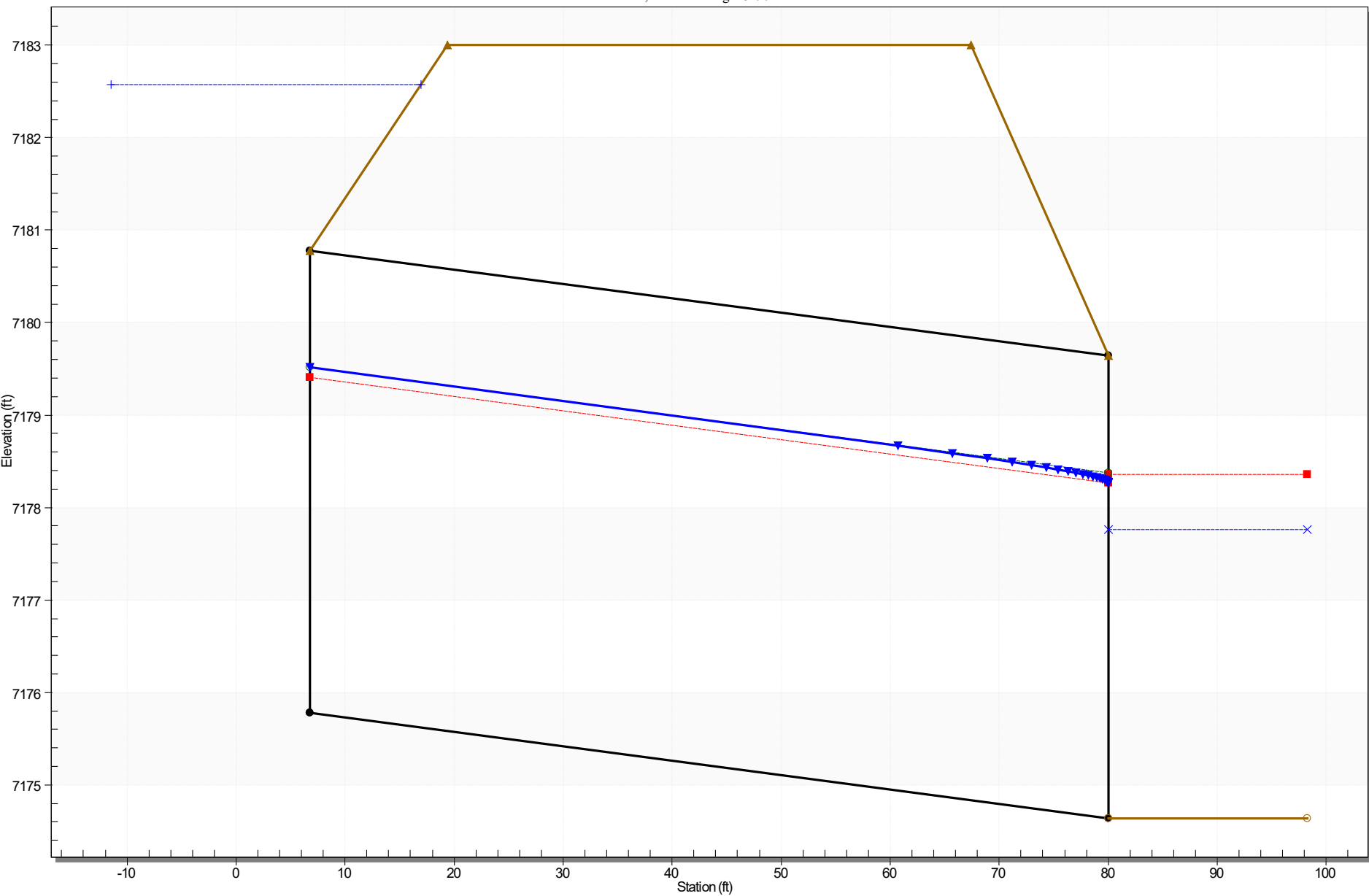
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Culvert - Culvert 1, Culvert Discharge - 338.0 cfs

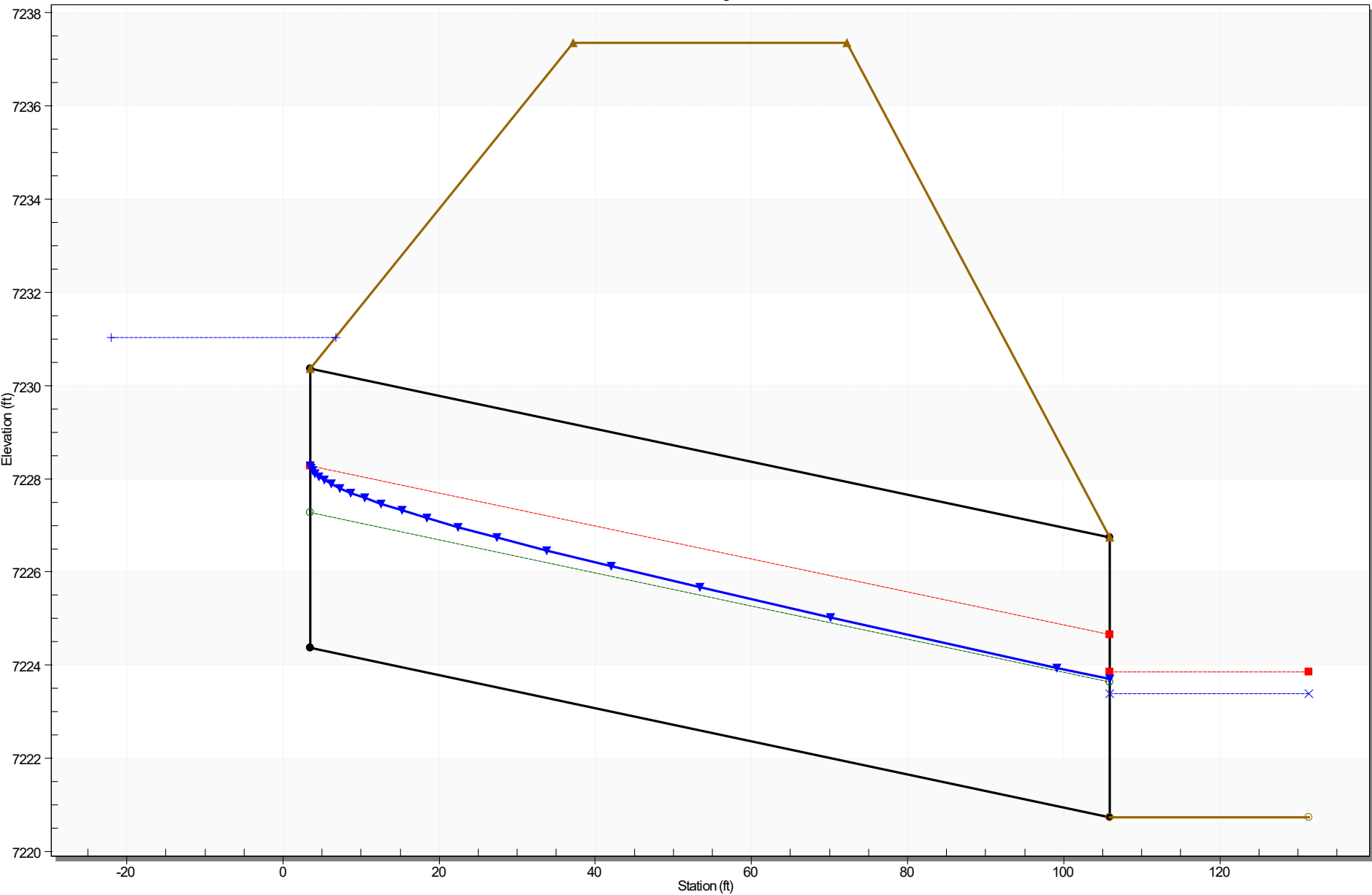


Crossing - Culvert #17, Design Discharge - 320.0 cfs

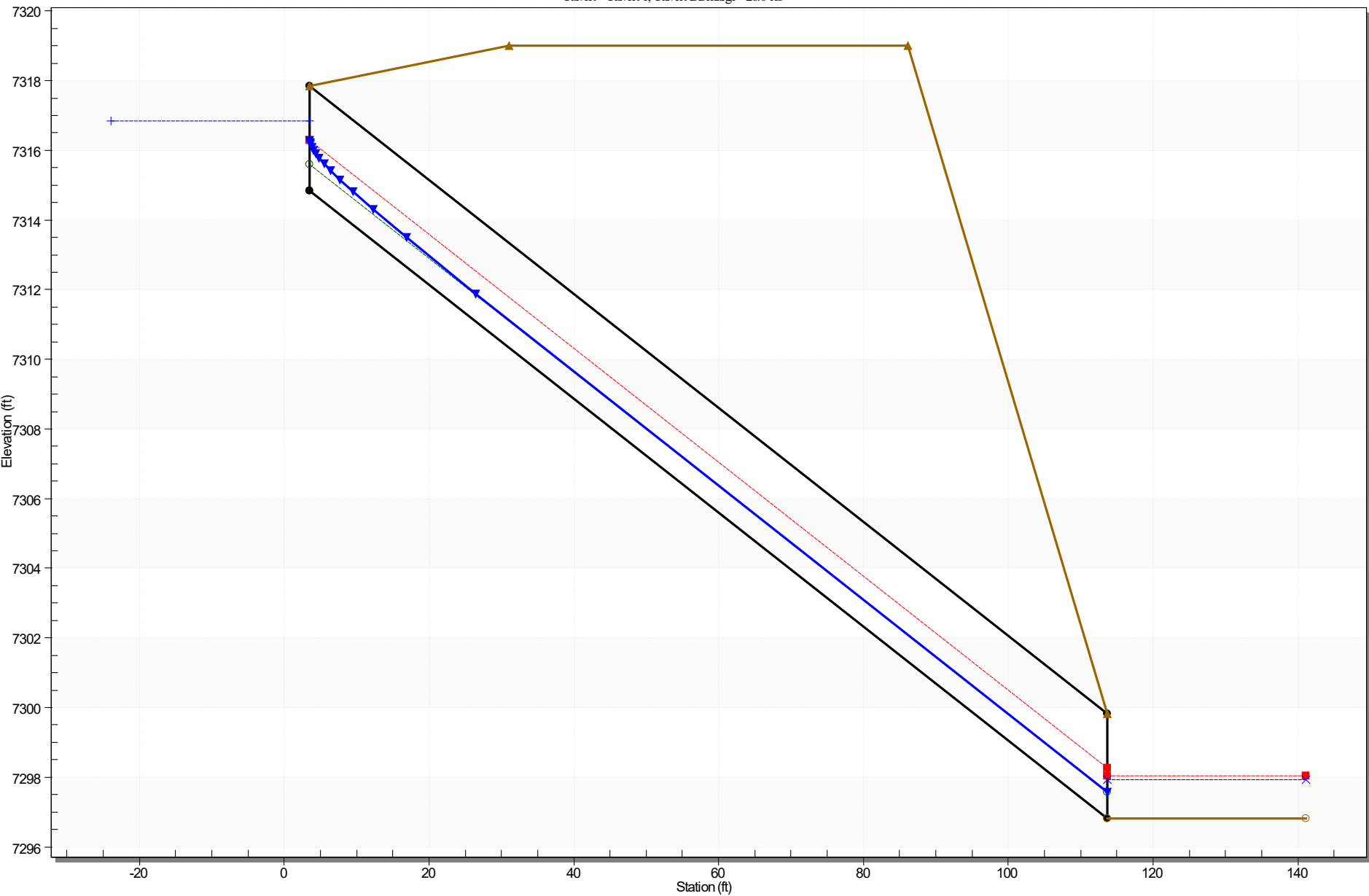
Culvert - Culvert 1, Culvert Discharge - 320.0 cfs



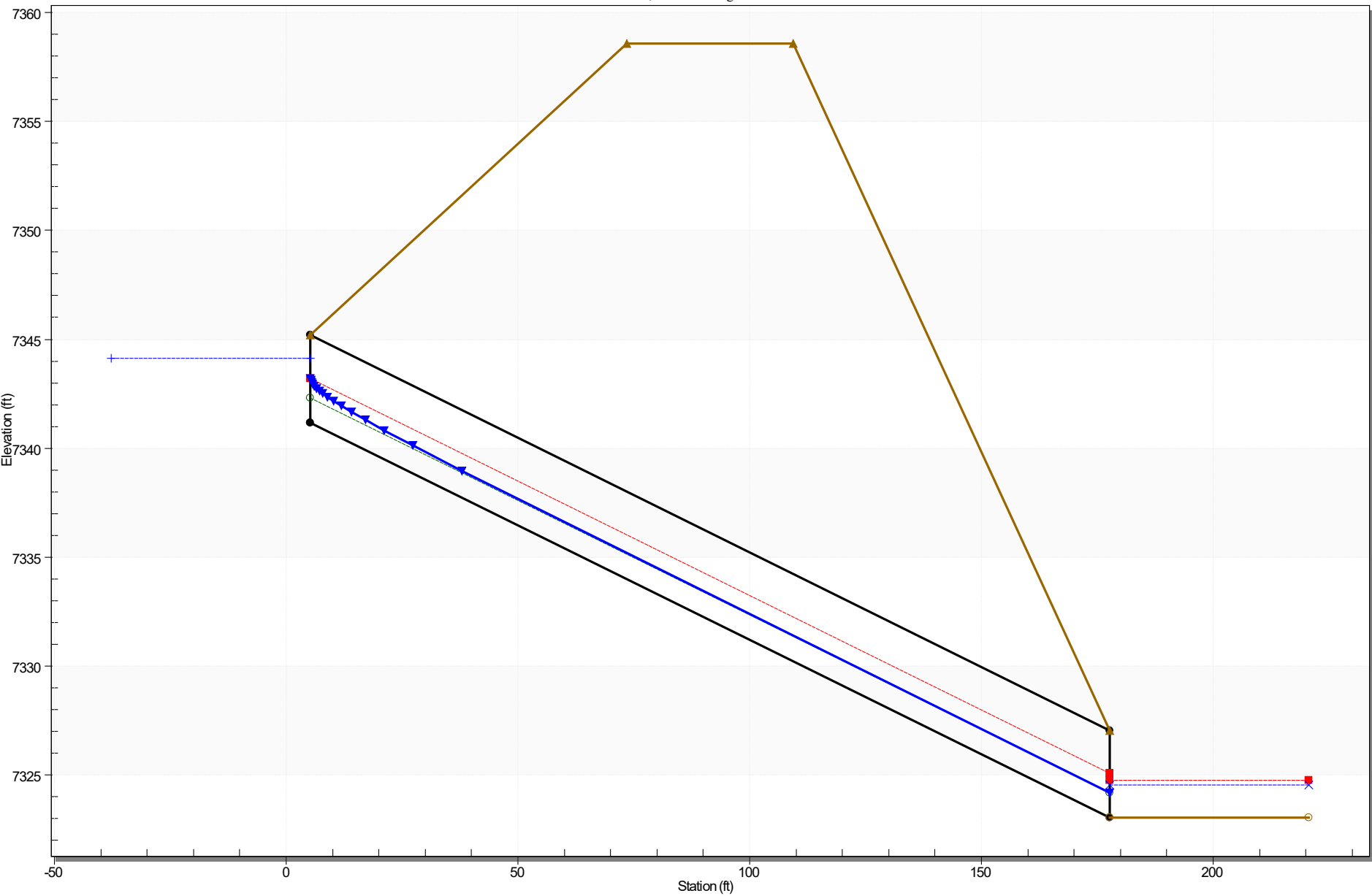
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Culvert - Culvert 1, Culvert Discharge - 205.0 cfs



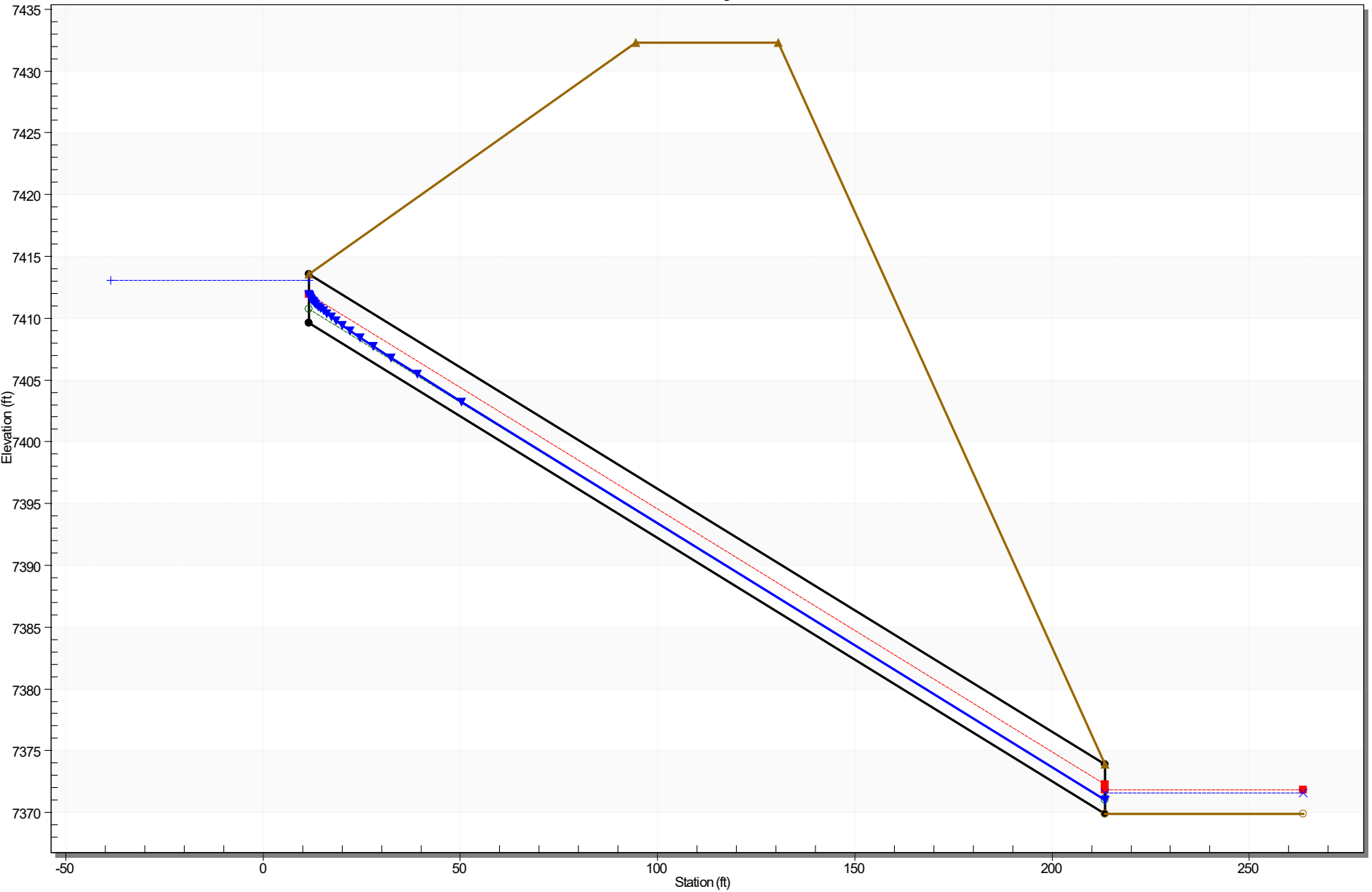
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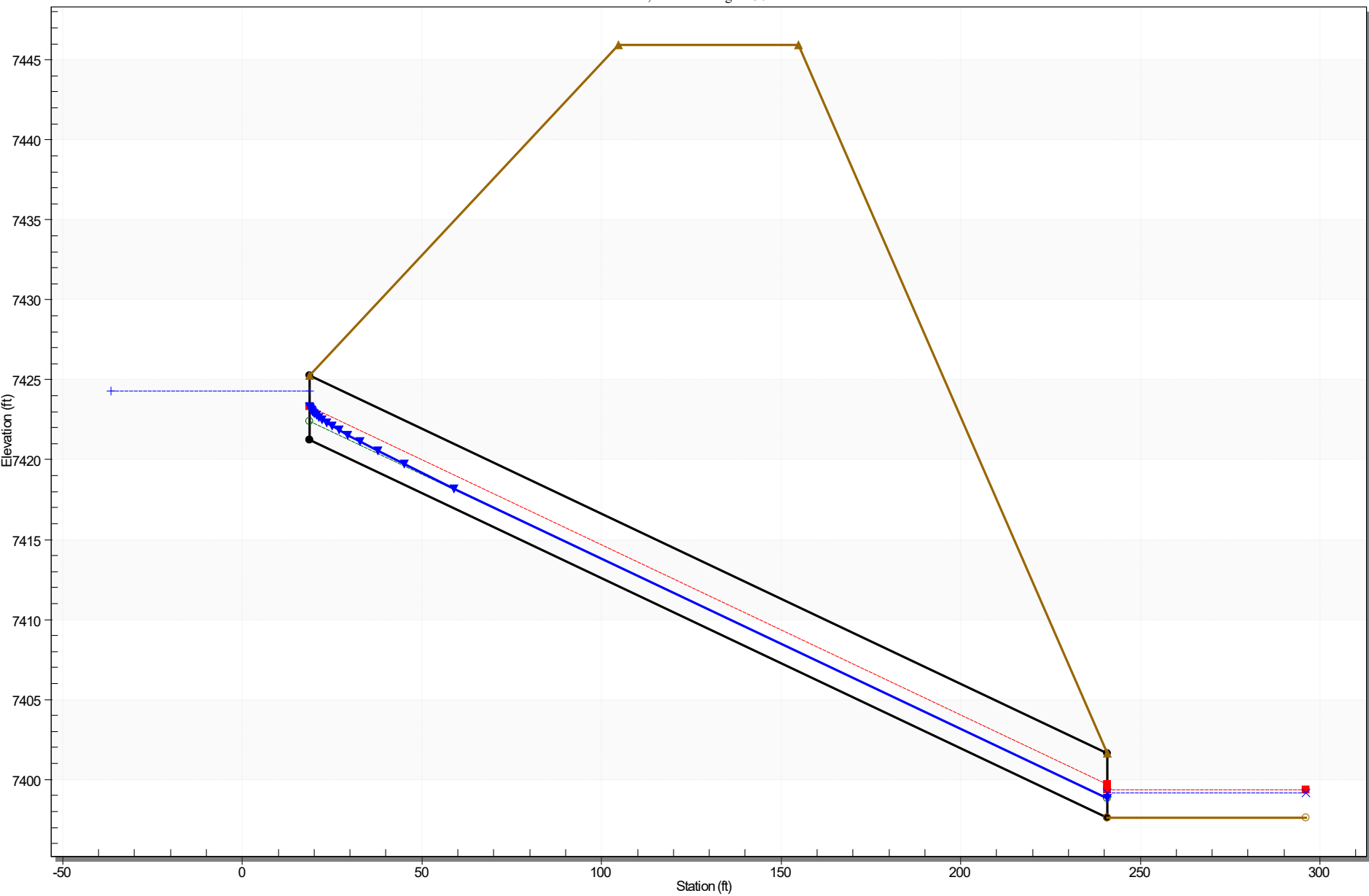
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Culvert - Culvert 1, Culvert Discharge - 45.0 cfs



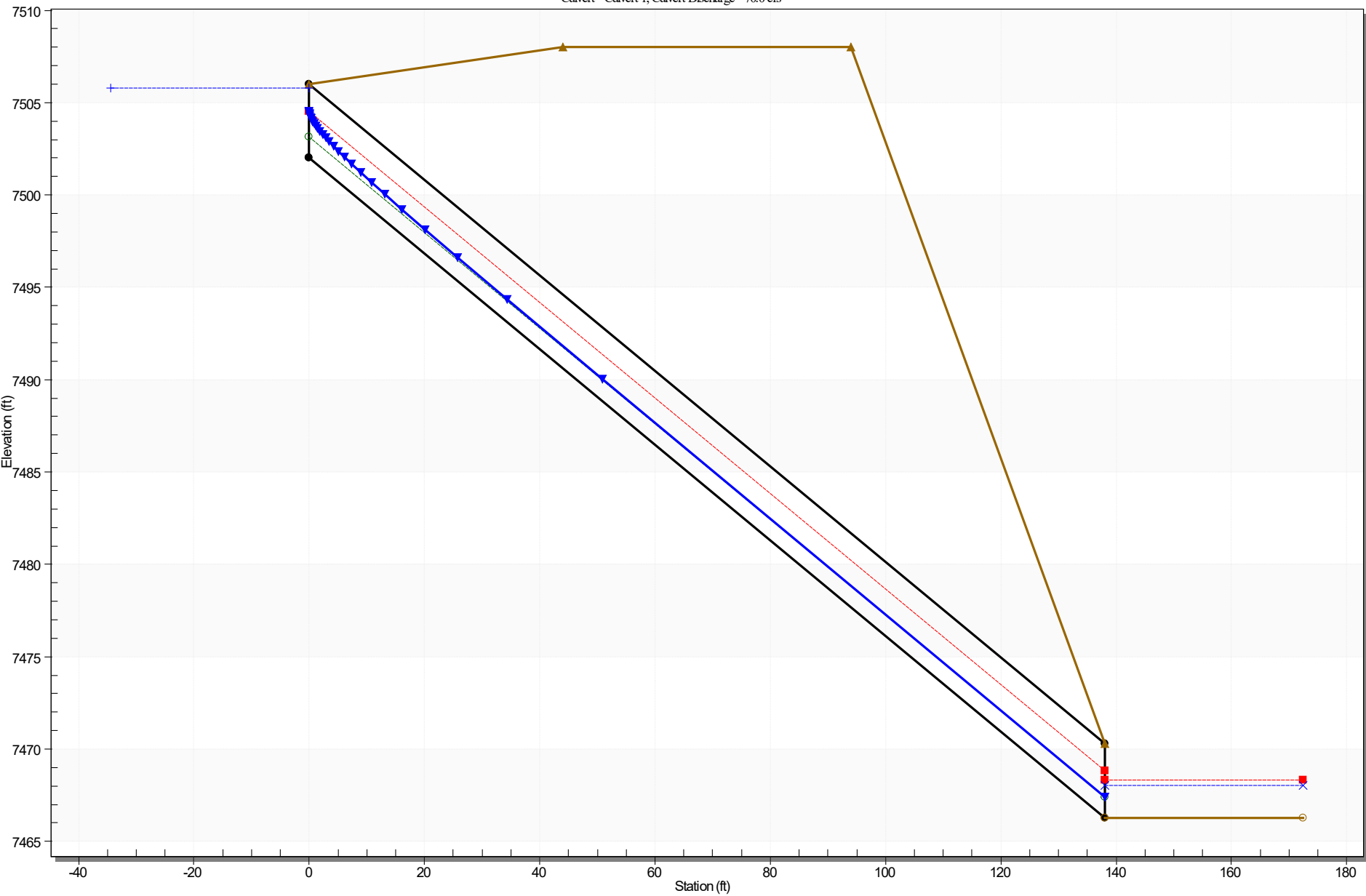
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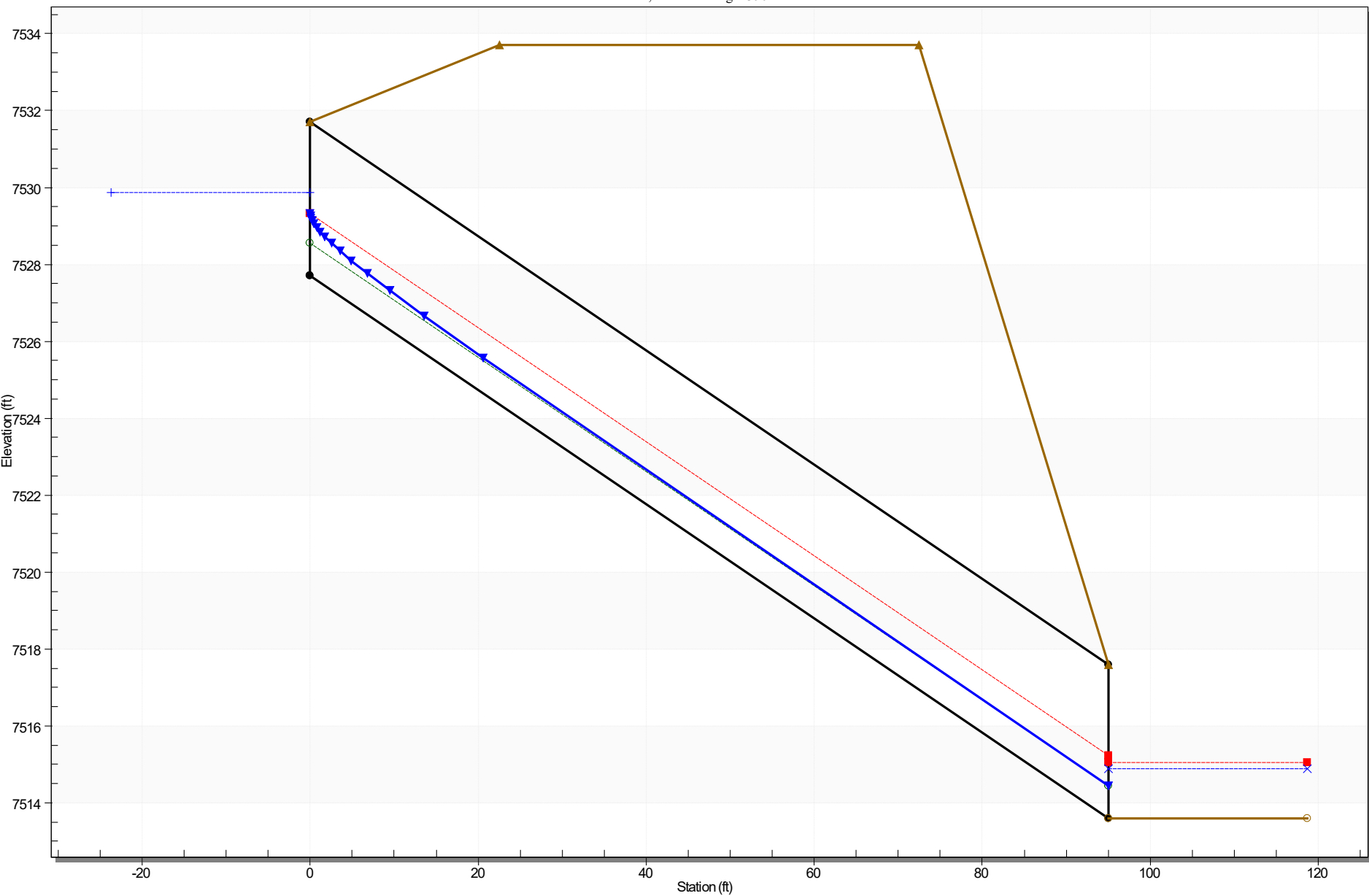
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Culvert - Culvert 1, Culvert Discharge - 70.0 cfs



Crossing - Culvert #24, Design Discharge - 30.0 cfs
Culvert - Culvert 1, Culvert Discharge - 30.0 cfs



With every community, we redefine what's possible.



Stantec is a global leader in sustainable engineering, architecture, and environmental consulting. The diverse perspectives of our partners and interested parties drive us to think beyond what's previously been done on critical issues like climate change, digital transformation, and future-proofing our cities and infrastructure. We innovate at the intersection of community, creativity, and client relationships to advance communities everywhere, so that together we can redefine what's possible.

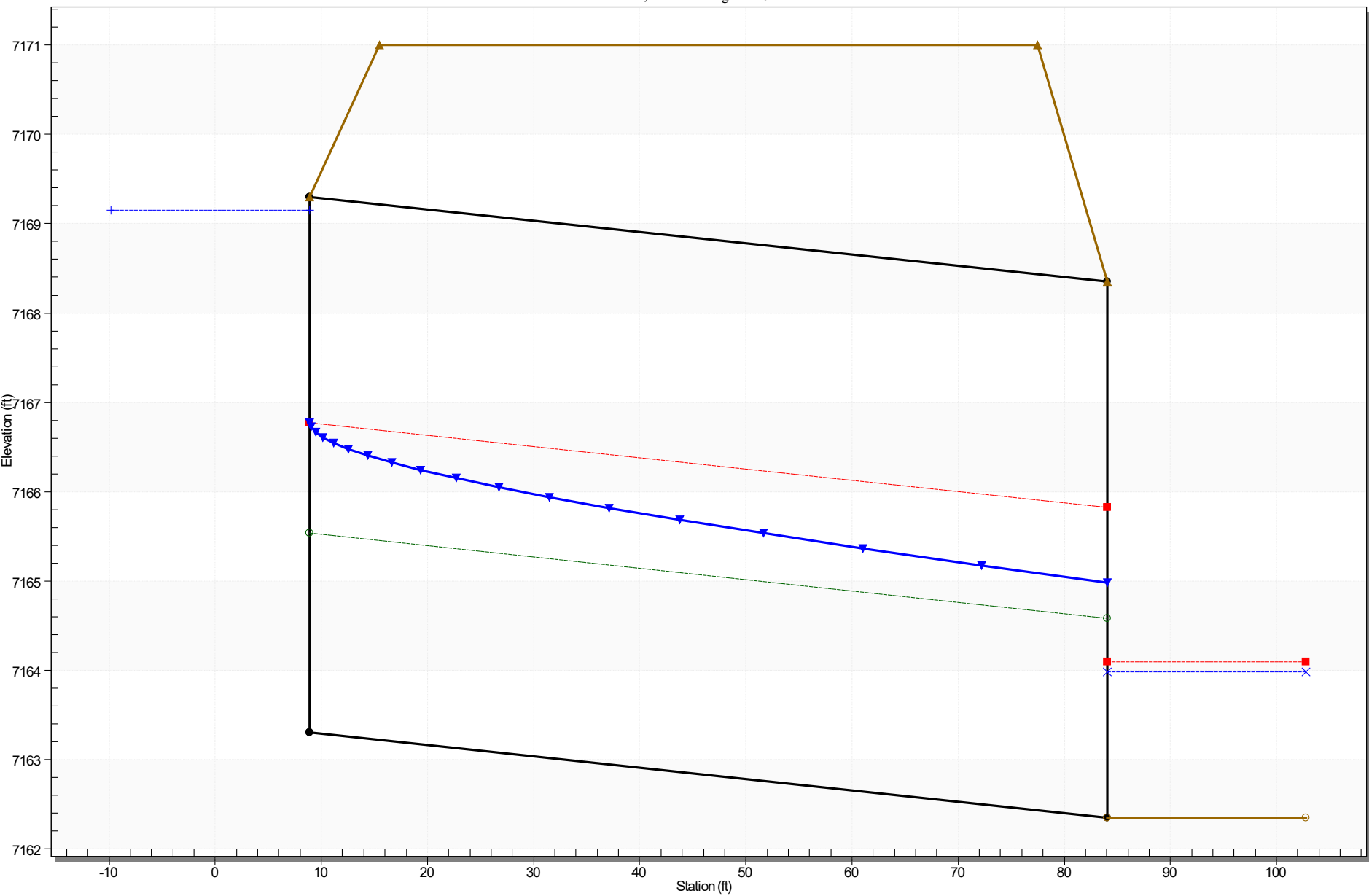
Stantec Consulting Services Inc.
410 17th Street, Suite 1400
Denver, CO 80202
stantec.com

Water Volume Calculations							
Pad	Description	Area (ft2)	100-year 24-hour Precipitation Depth, P (in)	Runoff Coefficient, C (-)	Water Volume (ft3)	Sediment Volume (ft3)	Total Retention Volume Required (ft3)
1	Sec 17 Stockpile Pad	1519950	2.43	0.915	281,628	6,999	288,627
2a/2b	Sec 17 Shaft Pad	876700	2.43	0.915	162,442	1,659	164,101
3a	Sec 16 Stockpile Pad 1	684160	2.43	0.915	126,766	1,216	127,982
3b	Sec 16 Stockpile Pad 2	886583	2.43	0.915	164,273	1,555	165,828
5	Sec 16 Shaft Pad	562209	2.43	0.915	104,170	752	104,923

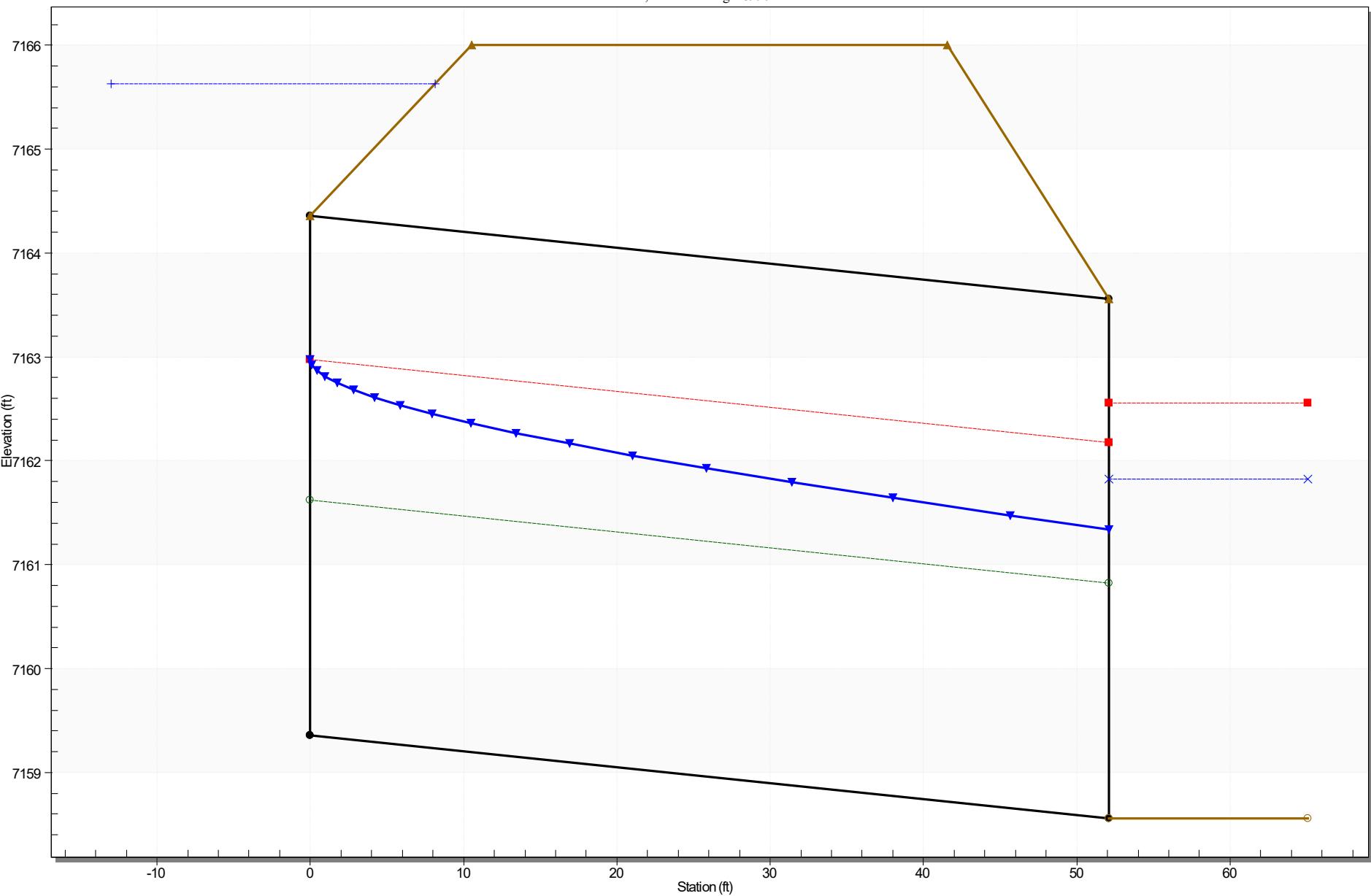
Sediment Volume Calculations							
Pad	Description	Rainfall Erosivity Factor, R	Soil Erodibility Factor, K (tons/acre)	Slope Length-Steepness Factor, LS (-)	Cropping-Management Factor, C (-)	Conservation Support Practice Factor, P (-)	Total Soil Loss, A (ft3)
1	Sec 17 Stockpile Pad	19.55	0.27	2.09	1	1	6998.57
2a/2b	Sec 17 Shaft Pad	19.55	0.27	0.86	1	1	1658.60
3a	Sec 16 Stockpile Pad 1	19.55	0.27	0.81	1	1	1215.53
3b	Sec 16 Stockpile Pad 2	19.55	0.27	0.80	1	1	1554.66
5	Sec 16 Shaft Pad	19.55	0.27	0.61	1	1	752.32

Pad	Length (ft)	Slope (ft/ft)	LS Factor
1	1549	0.05	2.09
2a/2b	801	0.03	0.86
3a	1147	0.023	0.81
3b	1117	0.023	0.80
5	960	0.02	0.61

Crossing - Culvert #1, Design Discharge - 441.0 cfs
Culvert - Culvert 1, Culvert Discharge - 441.0 cfs

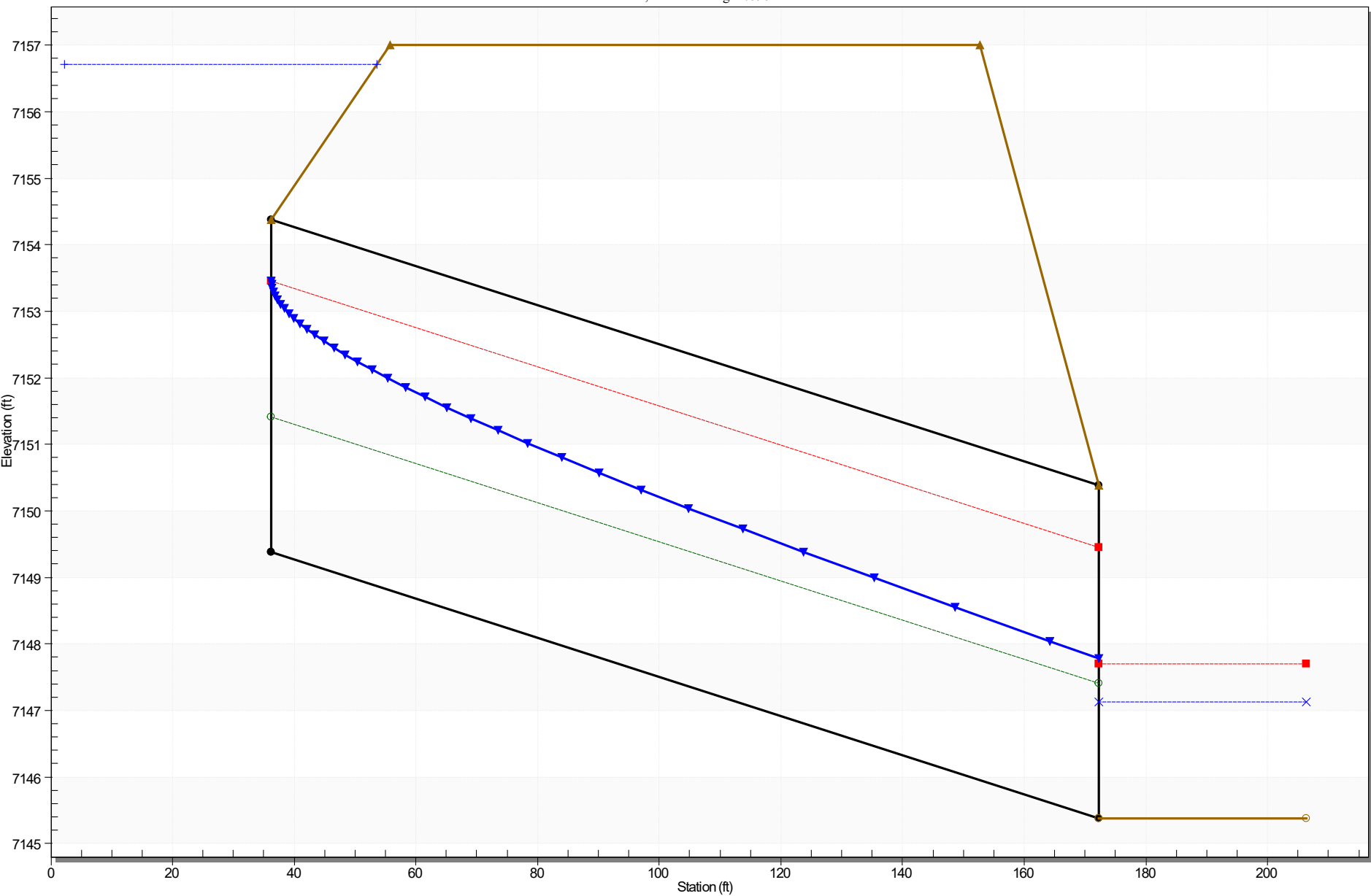


Crossing - Culvert #2, Design Discharge - 390.0 cfs
Culvert - Culvert 1, Culvert Discharge - 390.0 cfs

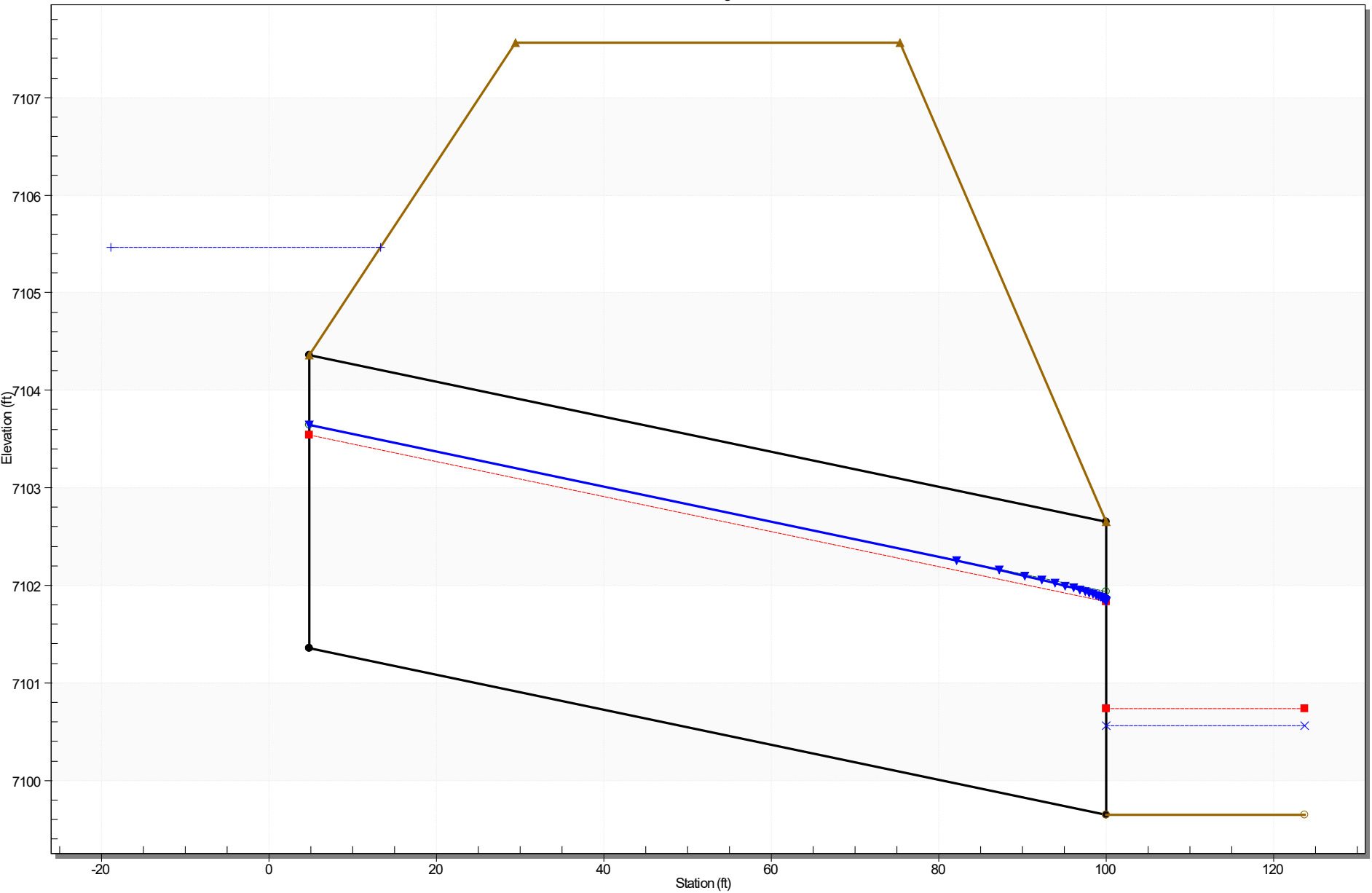


Crossing - Culvert #3, Design Discharge - 700.0 cfs

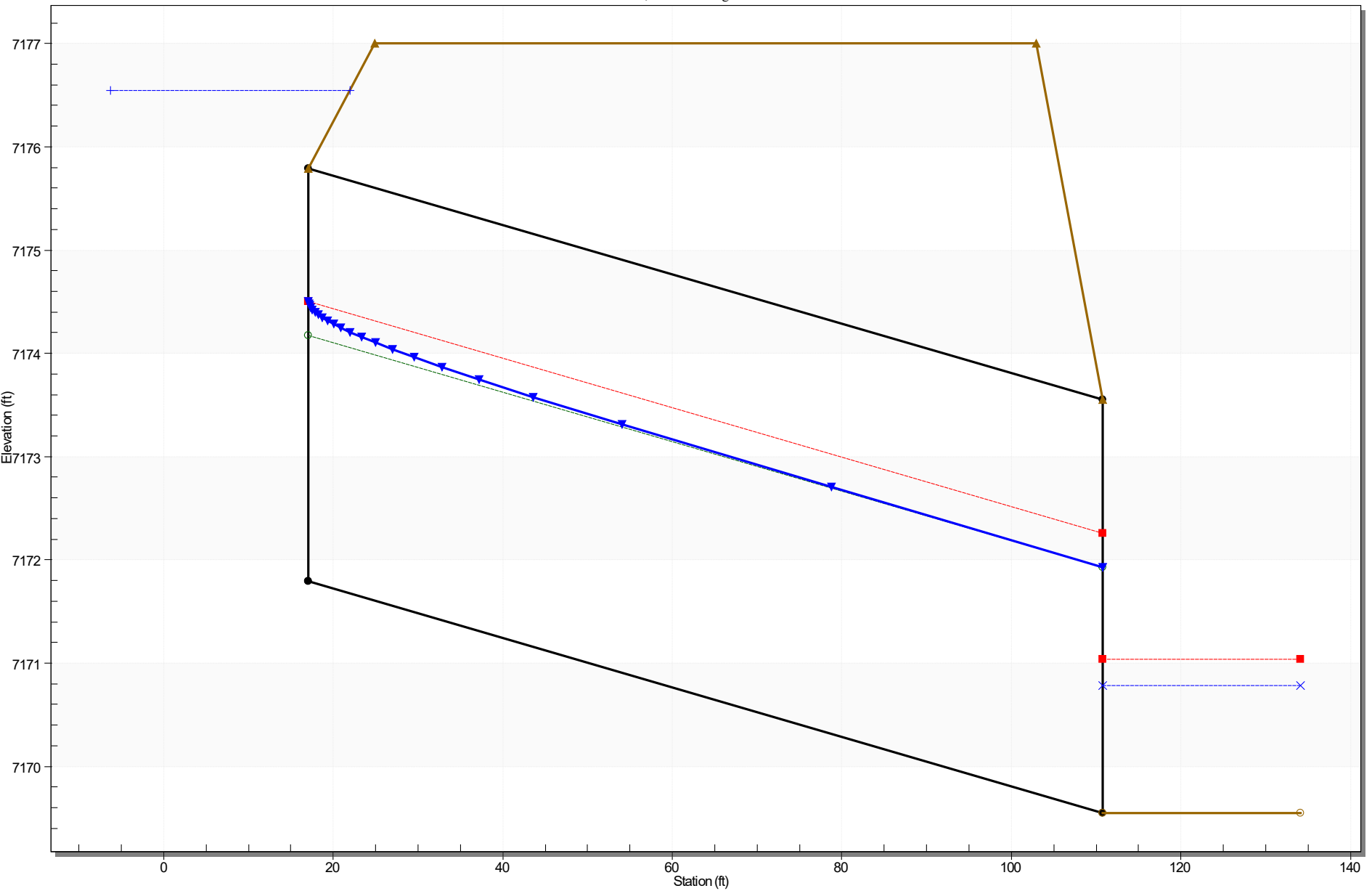
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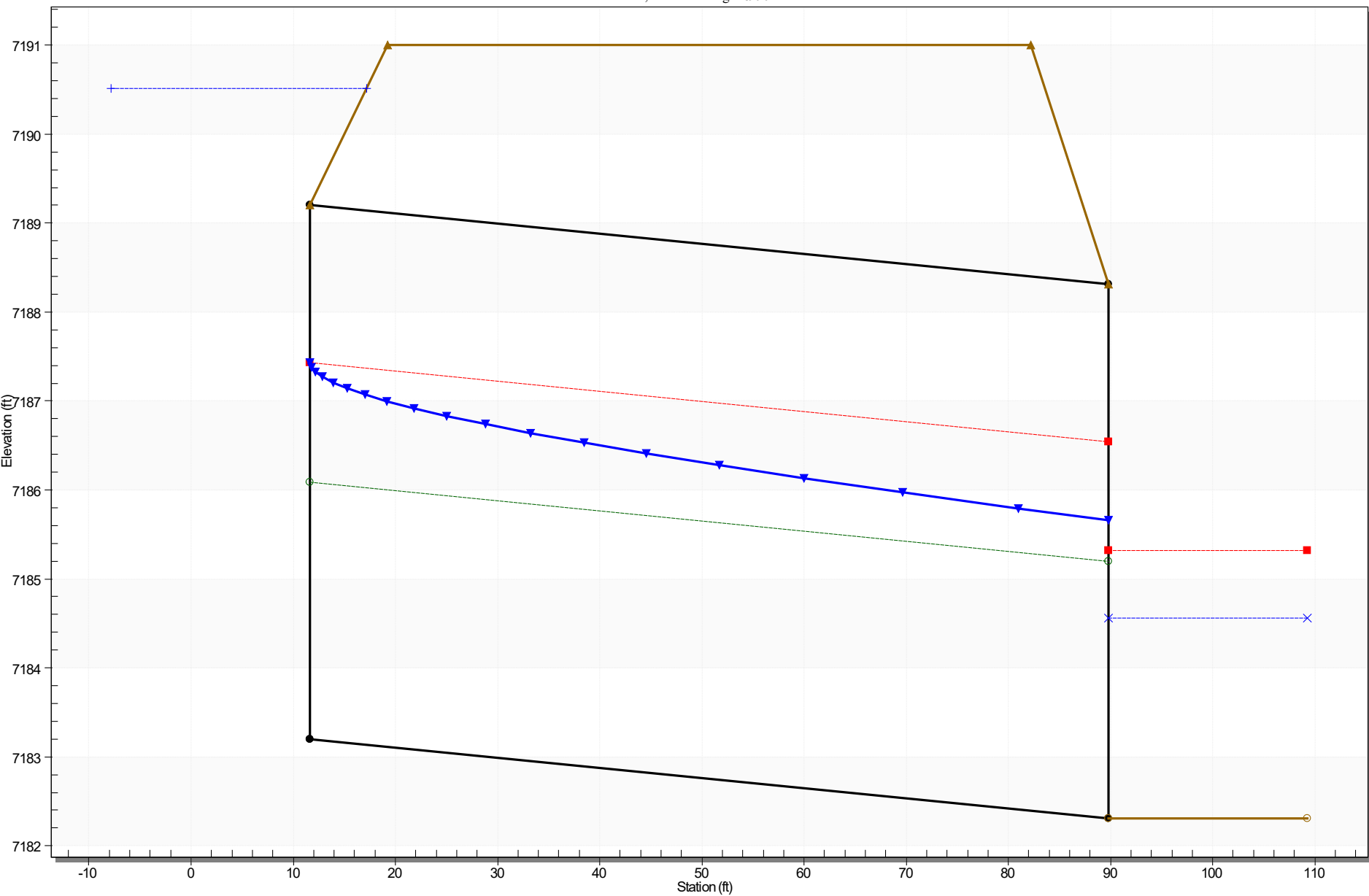
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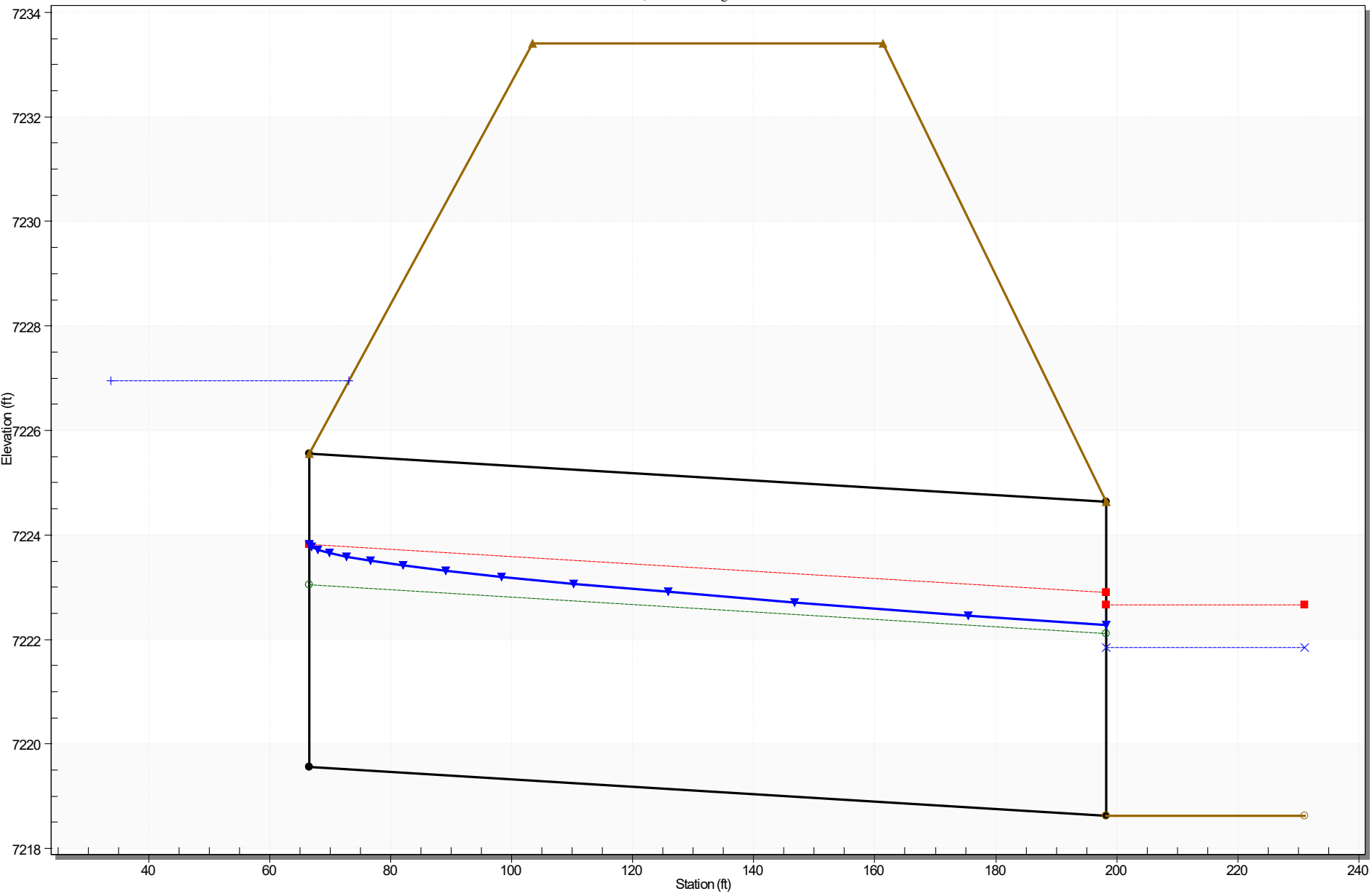
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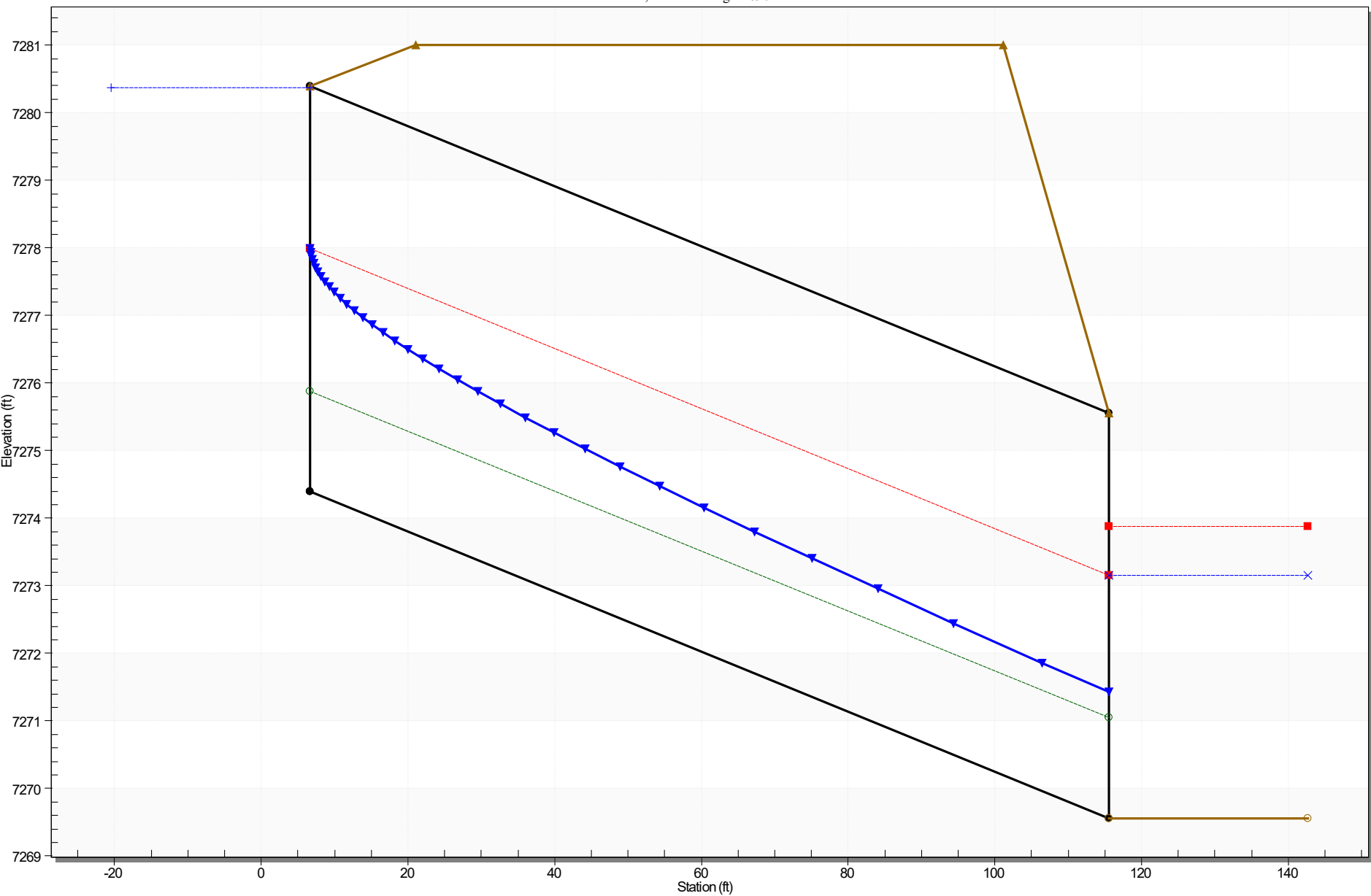
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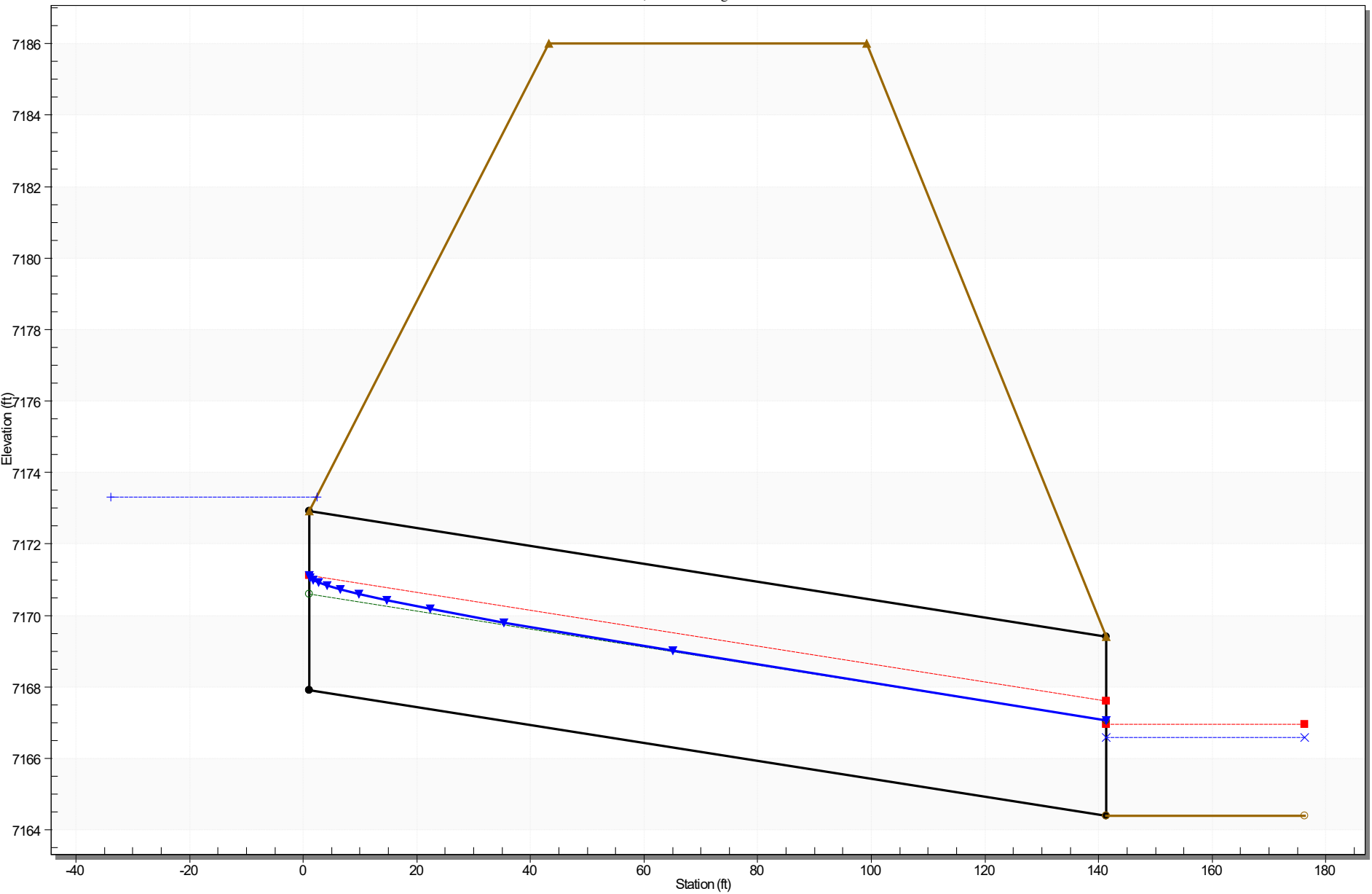
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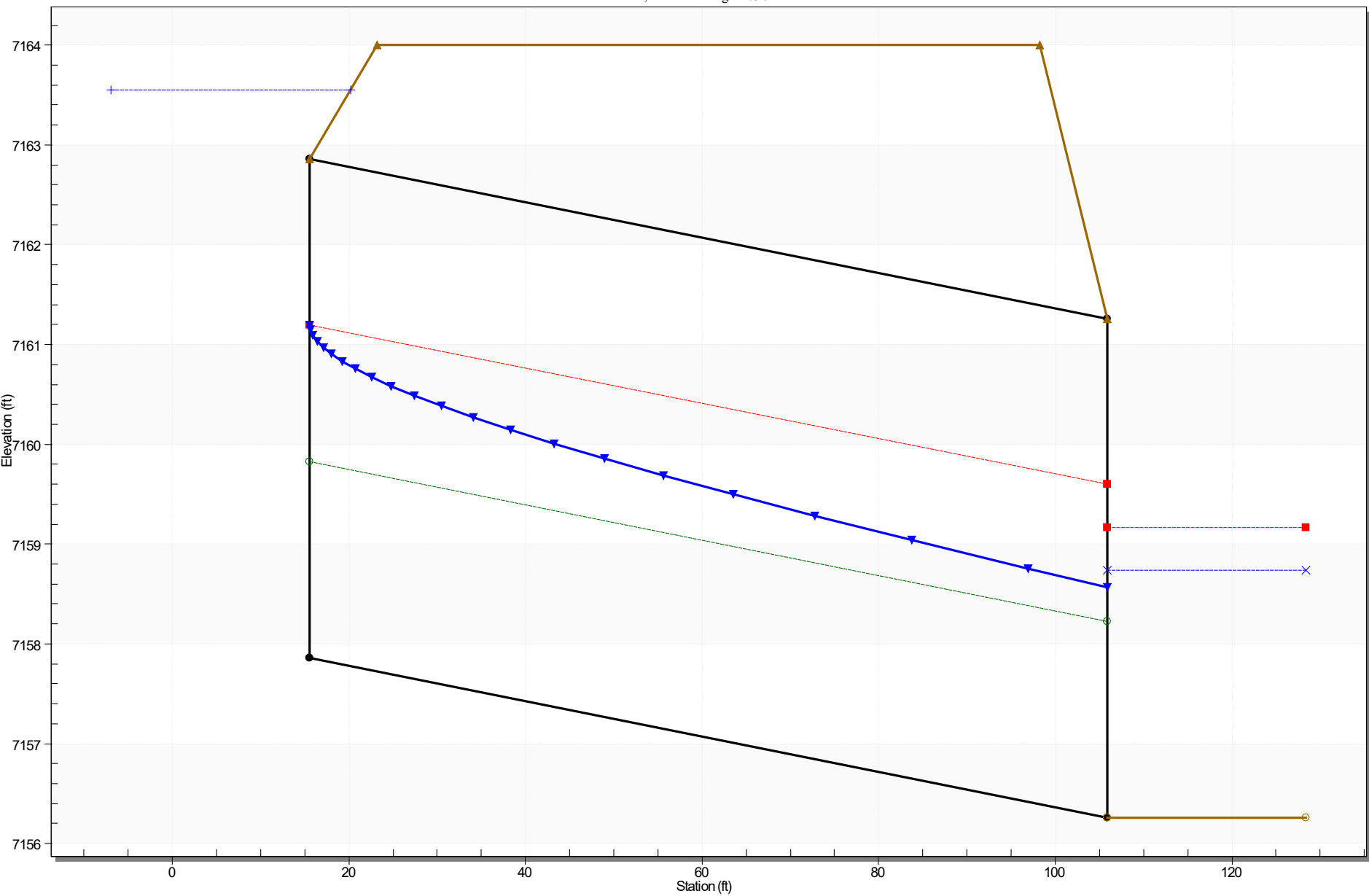
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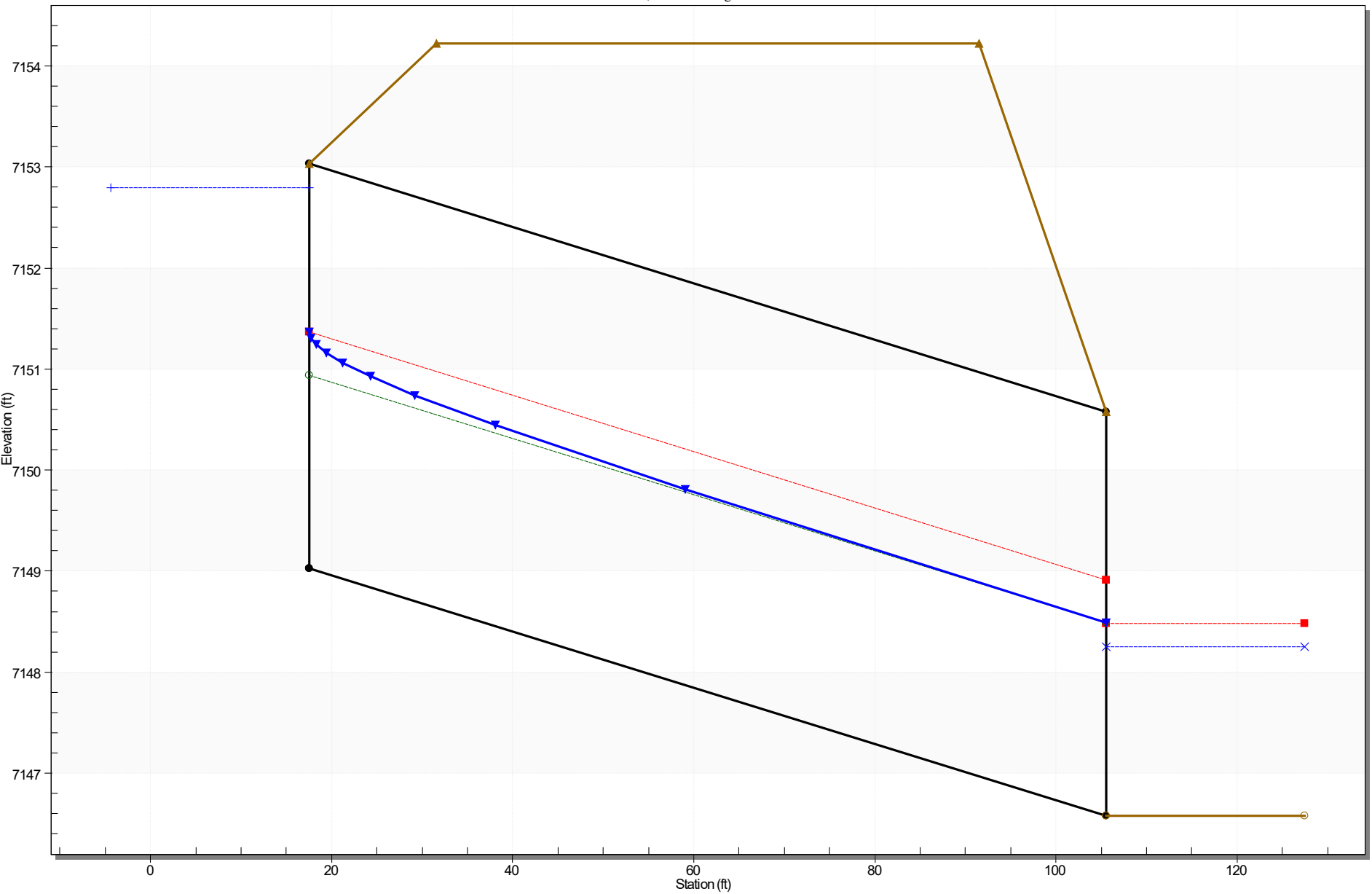
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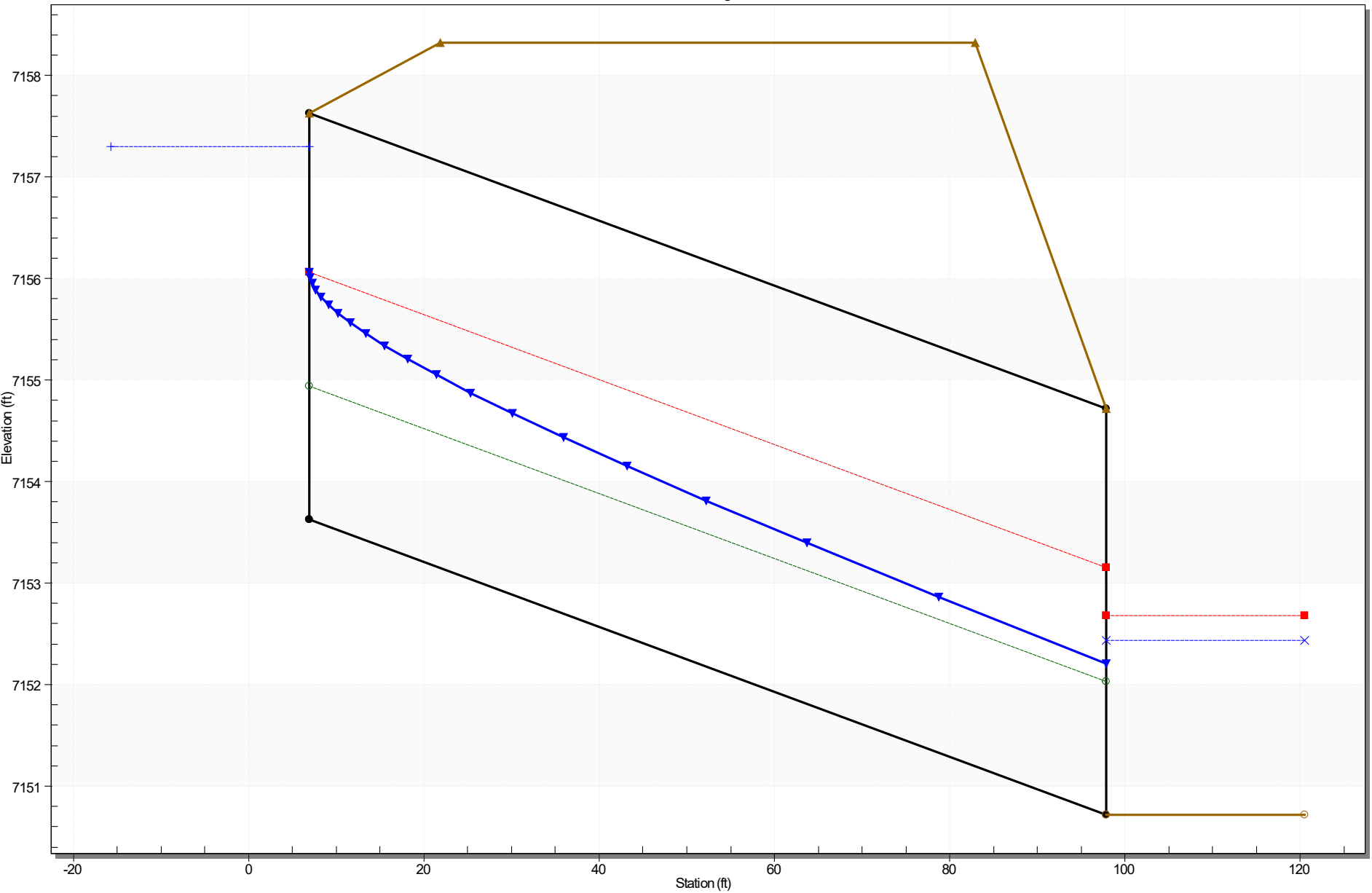
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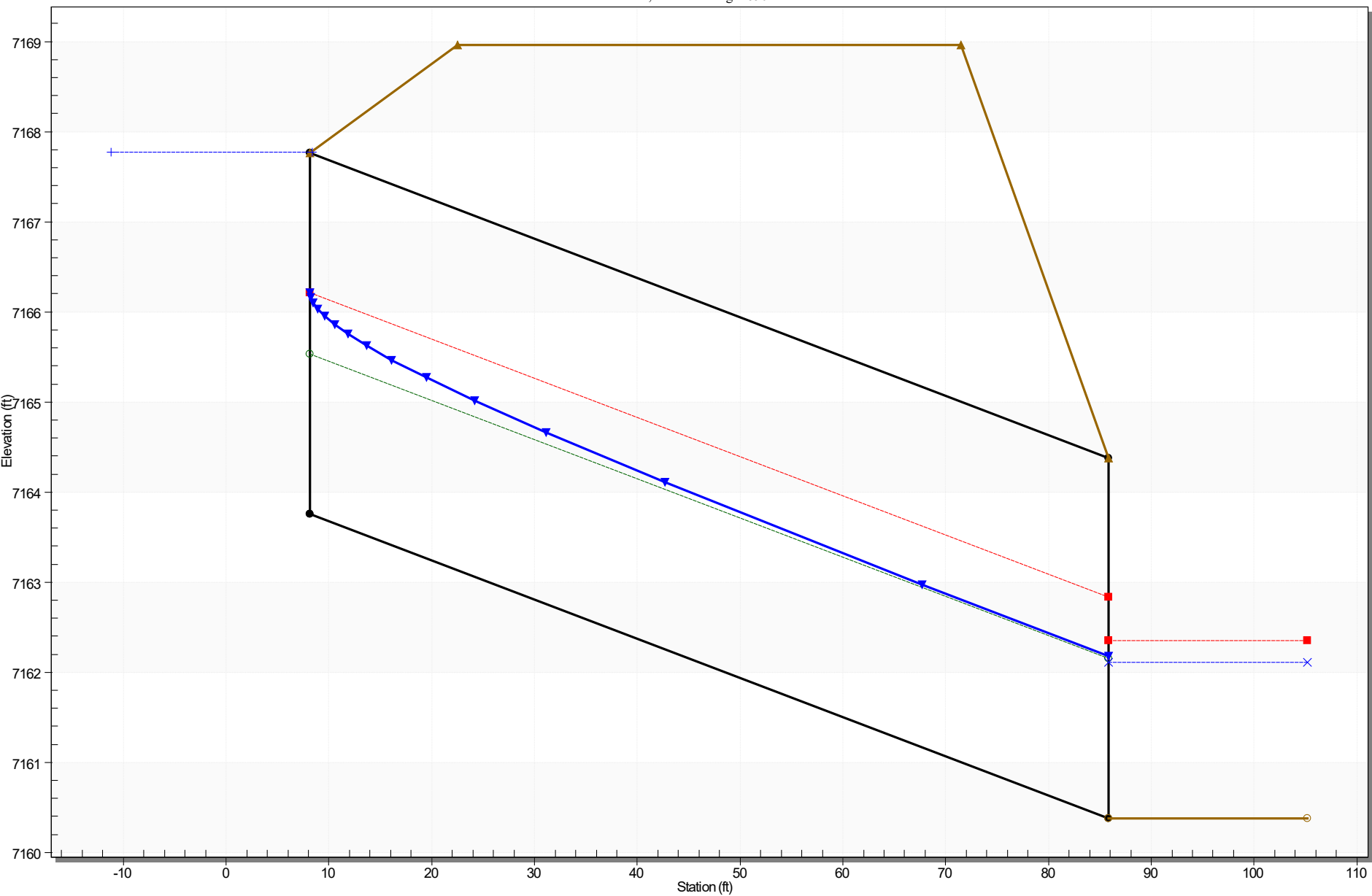
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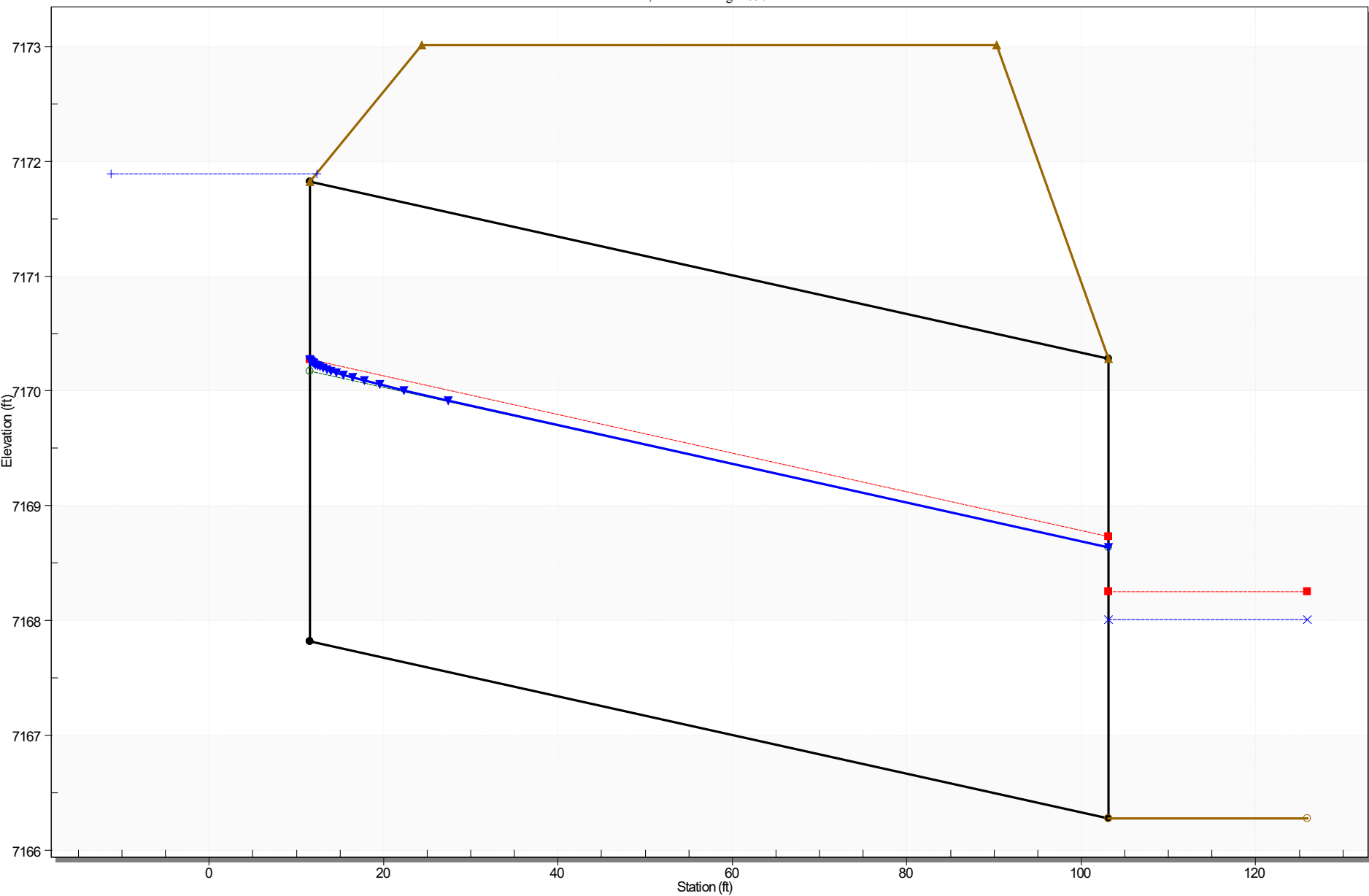
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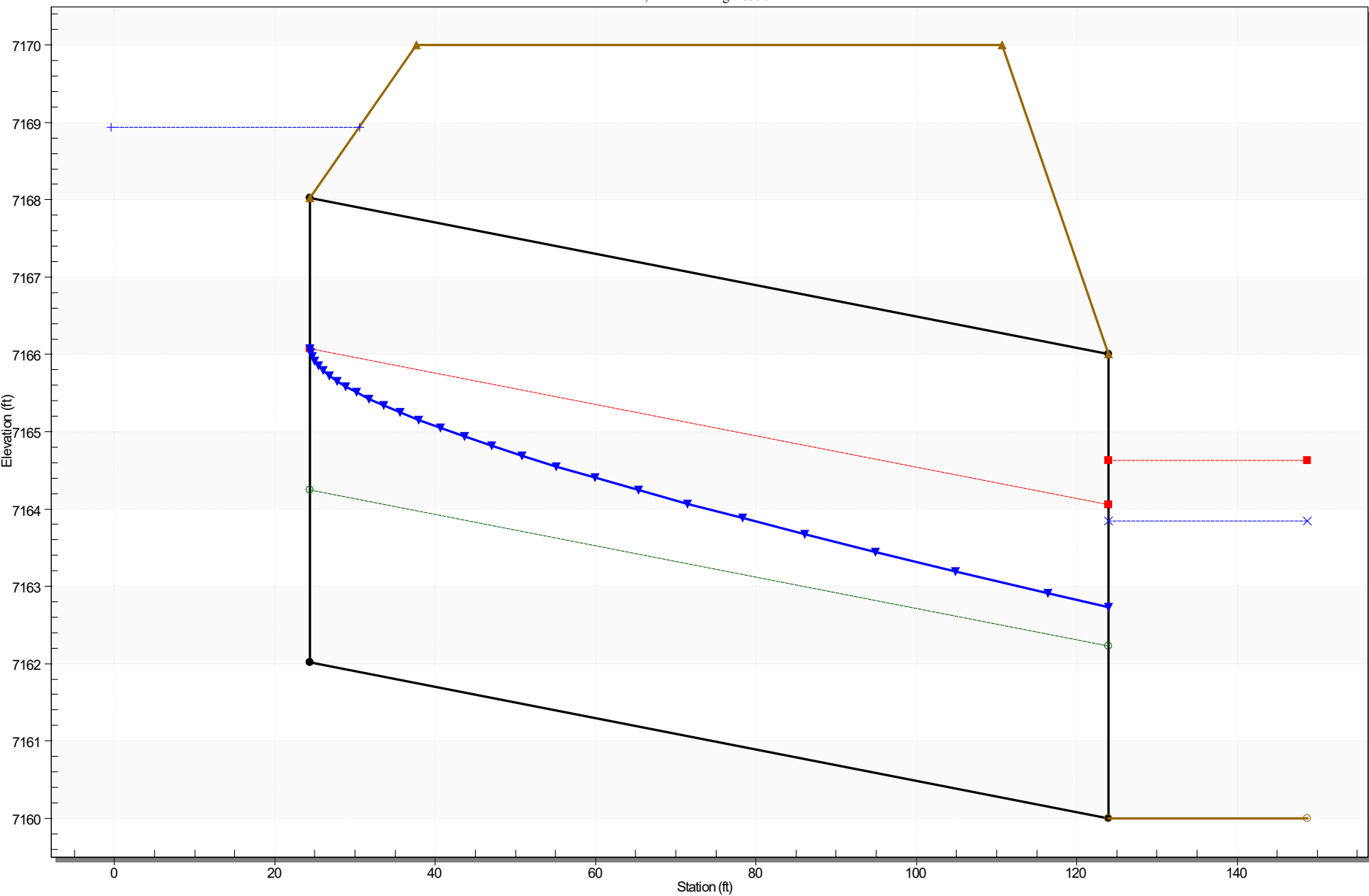


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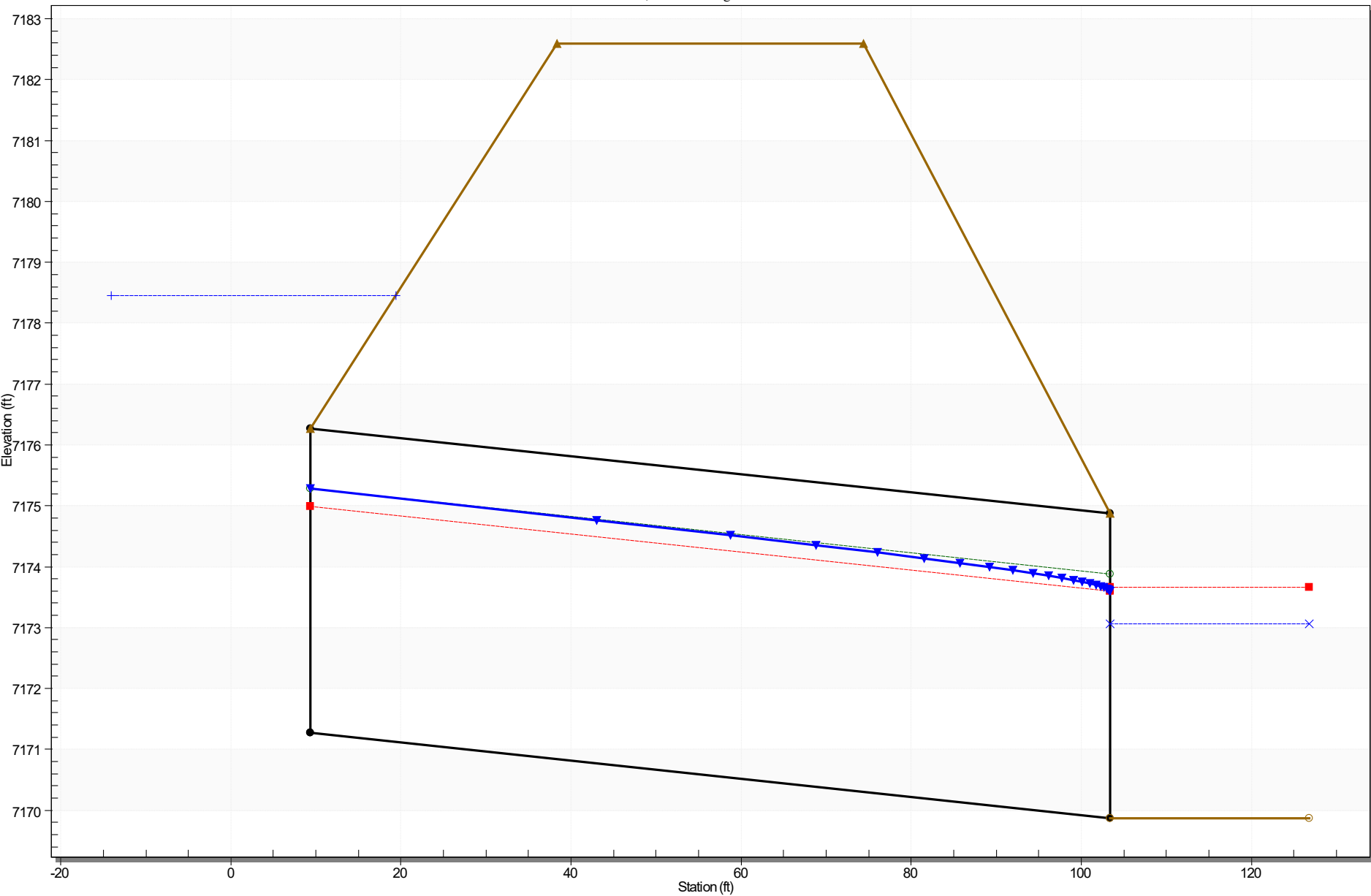
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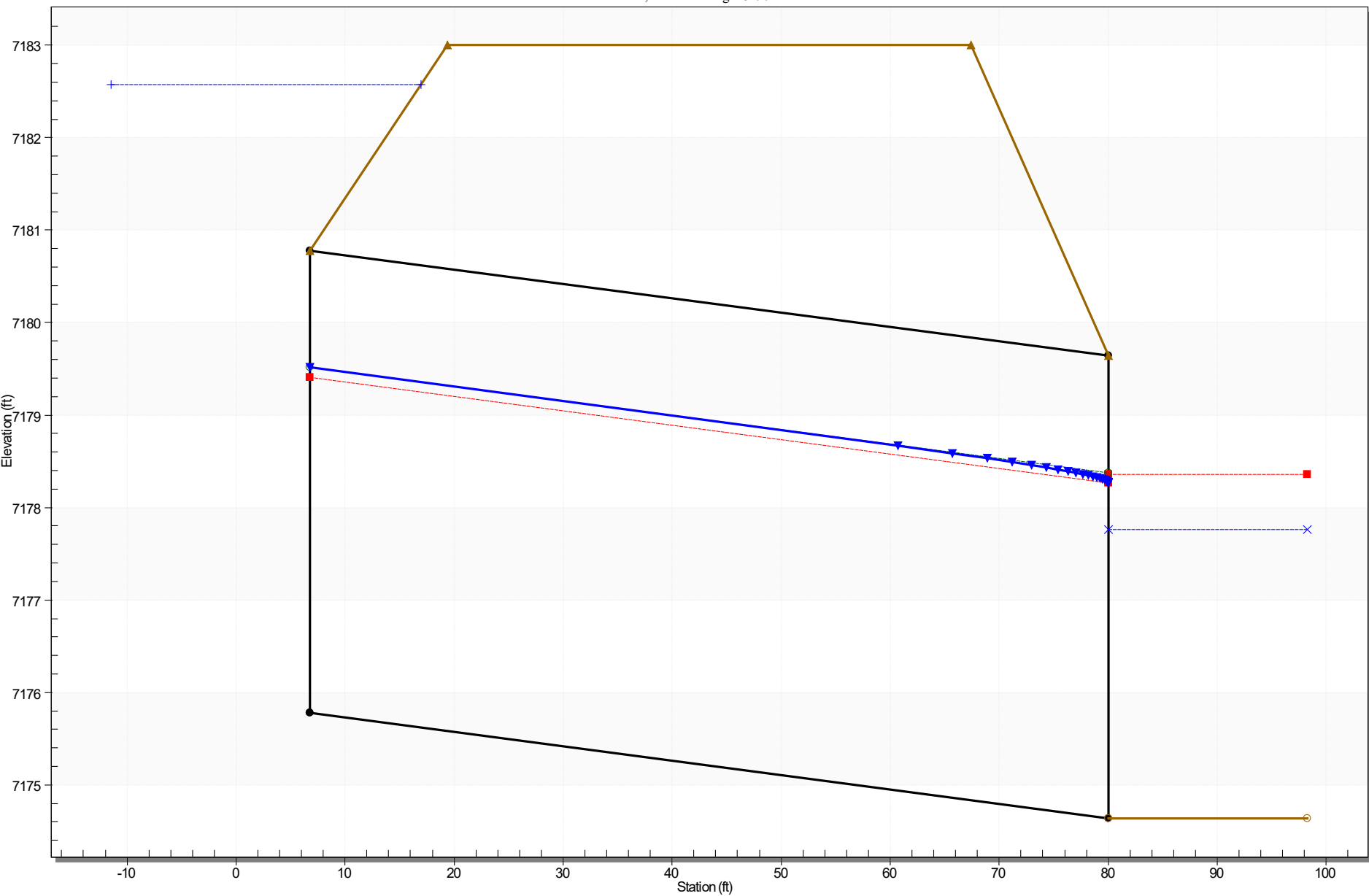
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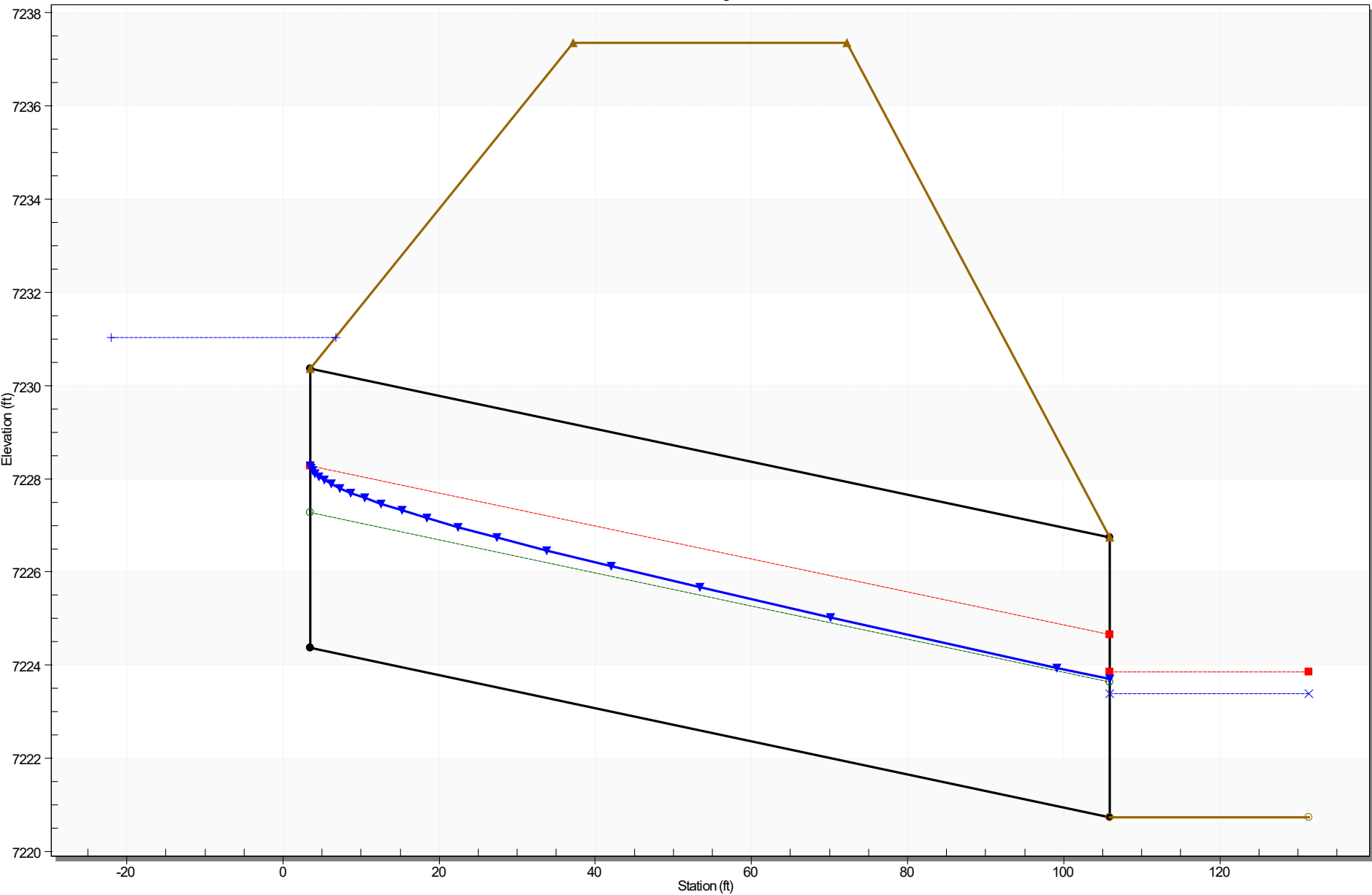


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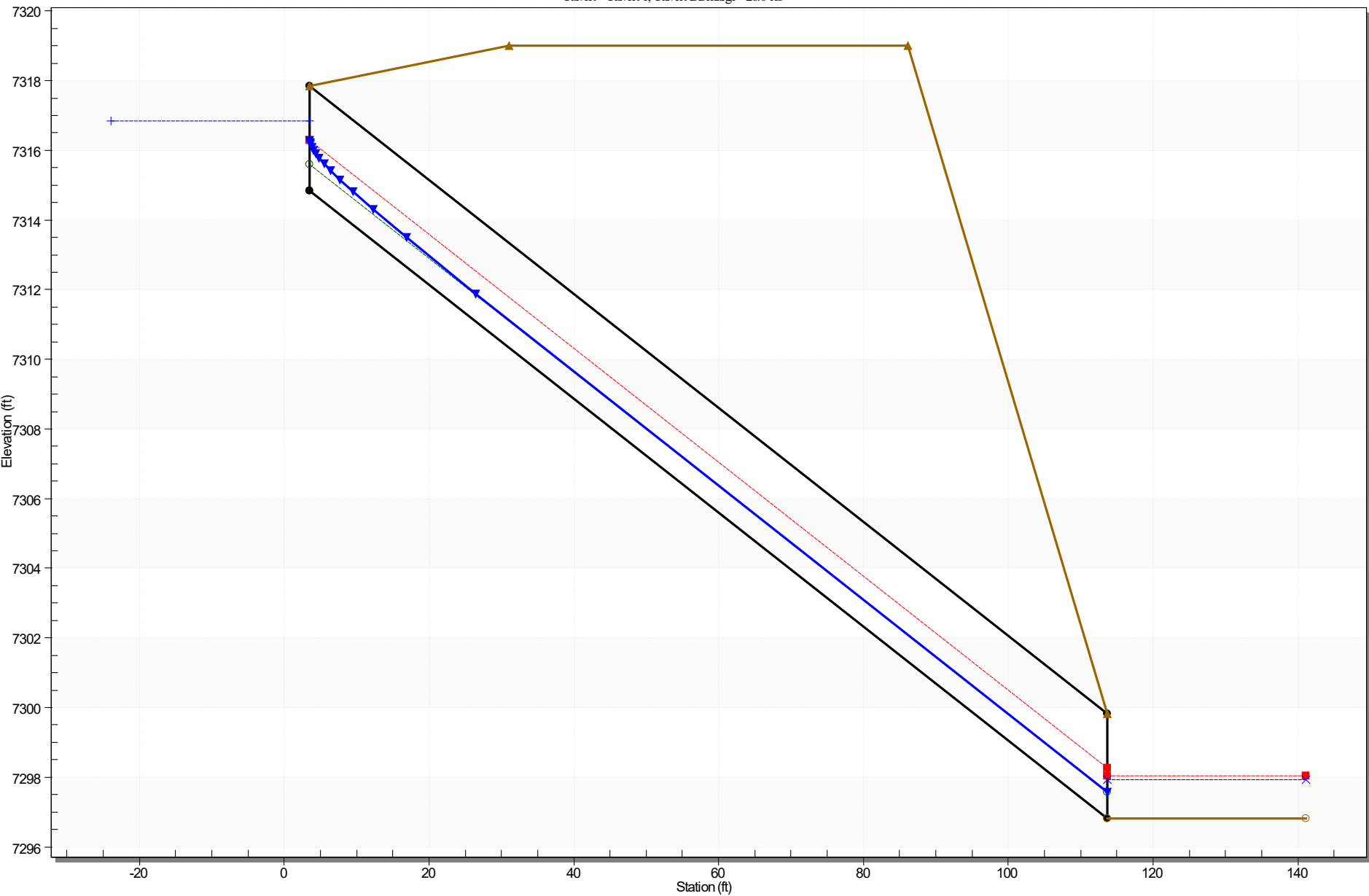
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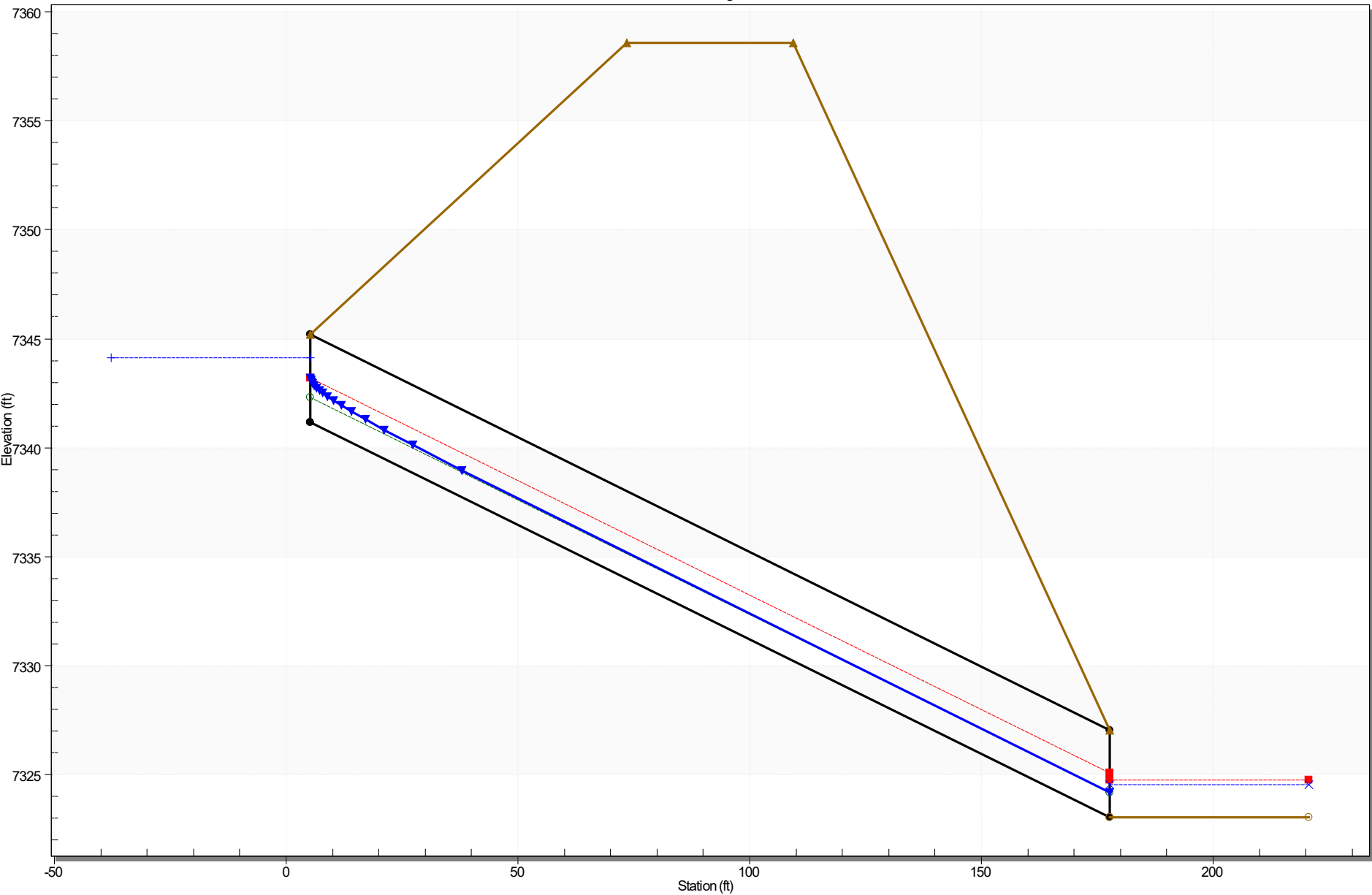
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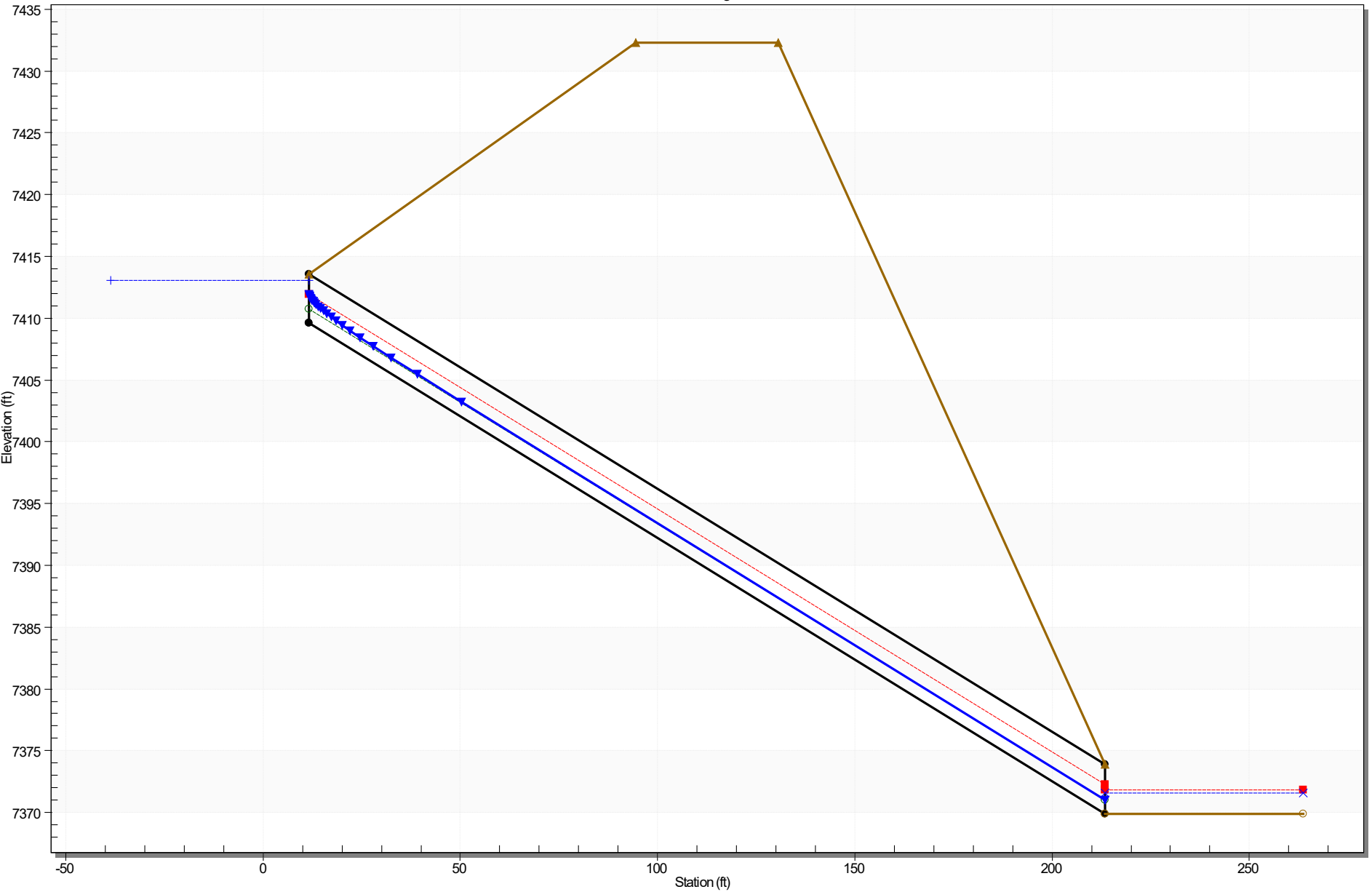
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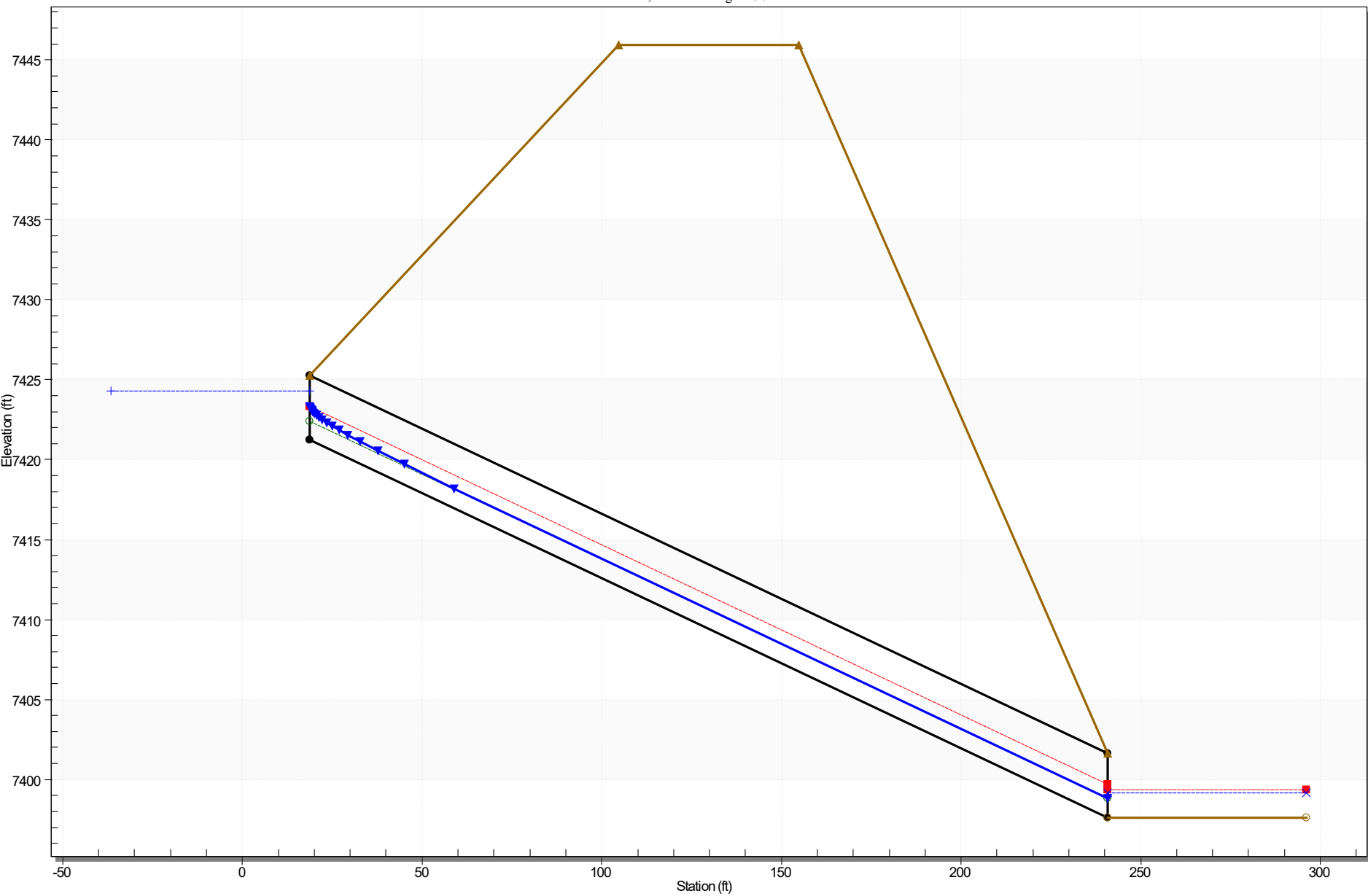
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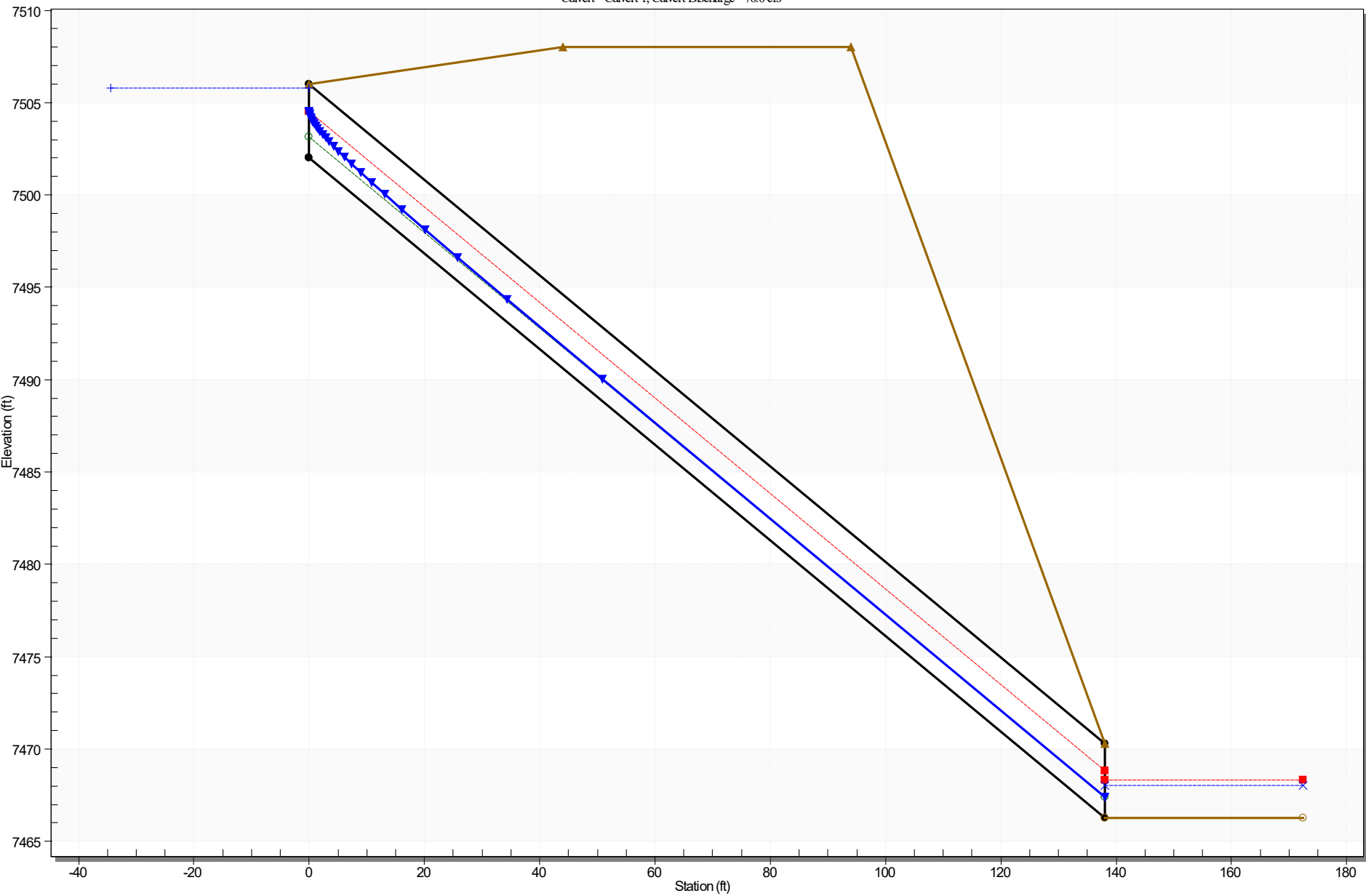
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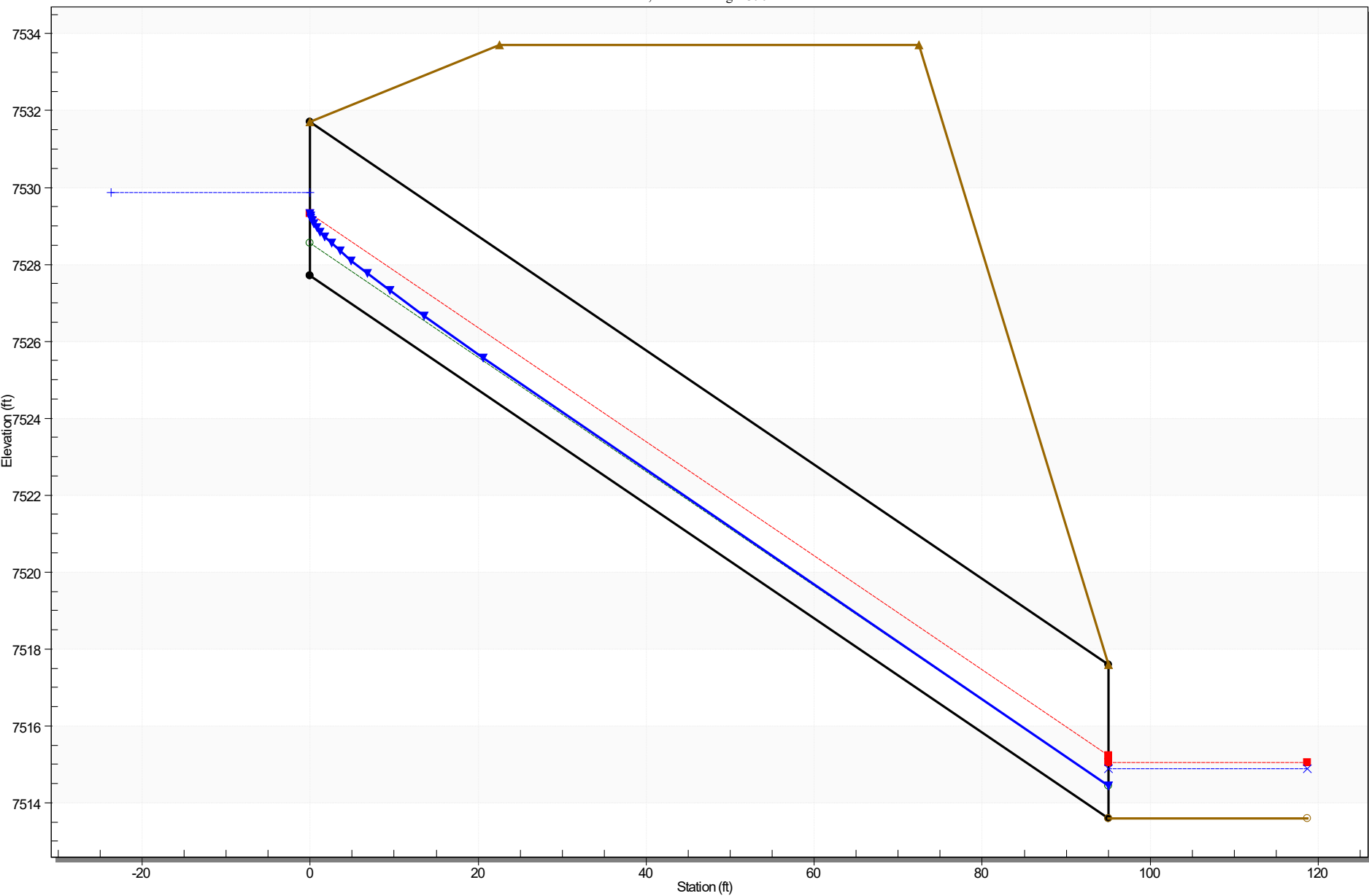
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Crossing - Culvert #24, Design Discharge - 30.0 cfs
Culvert - Culvert 1, Culvert Discharge - 30.0 cfs



Appendix C Wildlife Impacts Contingency Plan

ROCA HONDA MINE WILDLIFE IMPACTS CONTINGENCY PLAN



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Revised: 8/13/26

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1.0 PURPOSE AND REGULATORY BASIS

This Wildlife Impacts Contingency Plan (WICP) establishes enforceable procedures, response protocols, and mitigation measures designed to prevent, minimize, and remediate adverse impacts to wildlife resources resulting from unplanned or emergency releases associated with the Roca Honda Mine project. The plan addresses a full spectrum of potential incident types, including but not limited to accidental discharges of toxic or hazardous substances, dewatering pipeline failures, containment breaches from lined or unlined impoundments, overtopping events, and releases of hydrocarbons or chemical reagents used in mining and water treatment operations.

The applicability of this WICP extends across the entire permitted mine footprint, including Sections 9, 10, 16, and 17, as well as all associated infrastructure such as process water conveyance systems, discharge pipelines, access and haul roads, lined pond systems, stormwater controls, and all disturbed or operational areas where wildlife exposure pathways may occur.

This plan is structured to meet or exceed all relevant federal and state regulatory requirements governing wildlife protection and environmental response. Specifically, it is designed to ensure compliance with the wildlife contingency planning requirements under NMAC 19.10.6.602.D(15)(d), the spill prevention and control provisions of 40 CFR Part 112 (SPCC), and the stormwater discharge management requirements of 40 CFR Part 122 (SWPPP). In addition, the WICP supports compliance with the National Environmental Policy Act (NEPA), including the protection of biological resources as evaluated in the project Environmental Impact Statement (EIS), and aligns with the U.S. Forest Service Land and Resource Management Plan (LRMP) for the Cibola National Forest, including provisions for Forest Service Focal Species and Species of Conservation Concern (SCC), as identified by the Cibola National Forest..

The plan further incorporates protections required under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA), ensuring that both common and special-status species are afforded appropriate safeguards. Collectively, this framework ensures that wildlife protection measures are integrated into all phases of project operation and incident response.

2.0 BASELINE CONDITIONS (INCORPORATED FINDINGS)

2.1 Habitat Types

Baseline ecological surveys conducted within the project area identify a diverse mosaic of habitat types that collectively support a wide range of wildlife species. The dominant habitat is piñon–juniper woodland, which serves as the primary ecological driver in the region and provides critical cover, nesting, and foraging opportunities for numerous avian and mammalian species. This woodland habitat transitions into juniper savanna and shrub–grassland

communities, which function as key foraging areas, particularly for large ungulates and ground-dwelling species.

Cliff and rock outcrop systems are present throughout the project area and represent high-value habitat features, particularly for raptor species that rely on these vertical structures for nesting and roosting. In addition, arroyos and ephemeral drainage systems traverse the landscape and serve as both ecological corridors and hydrologic transport pathways. These features are of particular importance because they can facilitate the movement of contaminants in the event of a release, thereby increasing potential wildlife exposure risks.

The interface between woodland and grassland habitats represents a zone of elevated ecological sensitivity due to the concentration of wildlife activity and the convergence of multiple habitat functions. These transition zones are therefore considered priority areas for protection and monitoring under this WICP.

2.2 Key Wildlife Receptors

The project area supports a suite of wildlife species identified as Forest Service Focal Species and Species of Conservation Concern (SCC), as identified by the Cibola National Forest. by the U.S. Forest Service, including mule deer (*Odocoileus hemionus*), elk (*Cervus canadensis*), juniper titmouse, and hairy woodpecker. These species are integral to ecosystem function and are used as proxies for evaluating habitat health and ecological integrity.

The focal species and Species of Conservation Concern applicable to the project will be those identified by the U.S. Forest Service during the biological review of the Plan of Operations. Wildlife protection measures contained in this WICP apply to all federally listed species, Forest Service focal species, Species of Conservation Concern, migratory birds protected under the Migratory Bird Treaty Act, and other native wildlife utilizing the project area.

These species depend on a combination of habitat components, including open grasslands and savannas for foraging, woodland areas for nesting and cover, and established movement corridors that facilitate seasonal migration and daily movement patterns. Disruption to any of these components has the potential to result in measurable ecological impacts.

In addition to these indicator species, the project area provides habitat for several sensitive and special-status species. Peregrine falcons and golden eagles have been documented or have suitable nesting and roosting habitat within the project vicinity, particularly in cliff environments. The loggerhead shrike has been observed in the area, and multiple bat species, including spotted bats and various *Myotis* species, are known or expected to utilize cliffs, mine features, and subsurface openings for roosting.

High-risk exposure groups include raptors, which are susceptible to bioaccumulation of contaminants through prey; bats, which may utilize mine-related features and are sensitive to disturbance; ungulates, which may ingest contaminated water sources; and ground-dwelling mammals such as prairie dogs and skunks, which may encounter contaminated soil or sediments.

2.3 Critical Habitat Features

High-sensitivity features requiring protection include:

- Cliff faces (>50 ft) used for raptor nesting
- Arroyos and drainage corridors (primary contaminant transport pathways)
- Artificial and natural water sources (stock tanks, ephemeral pools)
- Mine shafts and subsurface features (bat roosting habitat)

3.0 RISK SCENARIOS

This WICP evaluates a range of credible release scenarios that could result in wildlife exposure. These scenarios are based on site-specific infrastructure, operational conditions, and environmental setting.

In addition to accidental releases, this WICP addresses routine operational activities that have the potential to adversely affect wildlife. Preventative measures identified herein are intended to reduce the likelihood of wildlife injury or mortality during construction, operation, maintenance, and reclamation of the Roca Honda Mine.

Surface water release scenarios include overtopping of lined ponds, failure of containment systems, or exceedance of stormwater management capacity during extreme precipitation events. Such releases have the potential to mobilize contaminants into adjacent habitats and drainage systems.

Dewatering pipeline failures represent another significant risk pathway. These may occur due to mechanical failure, corrosion, or external damage and could result in releases along the pipeline corridor. Given the alignment of pipelines with natural drainage features in some areas, such failures could rapidly transport contaminants into wildlife-use areas.

Chemical and hydrocarbon spills may occur at fuel storage locations, during equipment operation, or within the water treatment plant. These releases pose both acute and chronic toxicity risks to wildlife.

Finally, sediment and contaminant transport driven by storm events represents a diffuse but significant risk. Should engineering controls fail, contaminants associated with disturbed soils or stockpiles may be mobilized during precipitation events and transported into arroyos and downstream habitats, increasing the spatial extent of potential impacts.

3.1 Surface Water Release

- Pond overtopping or liner failure
- Stormwater containment exceedance

3.2 Dewatering Pipeline Failure

- Rupture or leak along pipelines
- Release into arroyos or drainage channels

3.3 Chemical / Hydrocarbon Spill

- Fuel storage or equipment failure
- Water treatment plant release during operations

3.4 Sediment / Contaminant Transport

- Storm-driven mobilization of contaminants
- Down-gradient migration into wildlife-use areas

3.5 Vehicle Collisions

Wildlife may sustain injury or mortality through collisions with employee vehicles, ore haul trucks, contractor vehicles, and mobile mining equipment. Collision risk may increase during dawn, dusk, and seasonal migration periods.

Mitigation:

- Speed limits on access roads
- Wildlife crossing awareness signage
- Driver training
- Reporting of wildlife collisions

3.6 Power Line/Guy Wire Collisions

Raptors, migratory birds, and bats may collide with overhead utility lines, communication towers, or guy wires associated with mine facilities.

Mitigation:

- Bird flight diverters where appropriate
- Marker balls on guy wires
- Compliance with Avian Power Line Interaction Committee (APLIC) guidance

3.7 Wildlife Entrapment and Drowning

Wildlife may become entrapped or drown in lined ponds, sediment basins, containment ponds, tanks, vaults, and excavations associated with mine operations.

All open water features capable of entrapping wildlife shall include escape ramps or equivalent egress structures.

3.8 Operational Disturbance (Noise, Traffic, and Heavy Equipment)

Routine construction, mining, and maintenance activities have the potential to temporarily disturb wildlife through increased human presence, vehicle traffic, and operation of mobile equipment. Potential disturbance is expected to be greatest during initial construction of surface facilities and infrastructure, with substantially lower disturbance during routine underground mining operations.

Potential disturbance sources include:

- Construction of surface facilities and utilities.
- Employee, contractor, and ore-haul vehicle traffic on access roads.
- Operation of mobile construction and maintenance equipment.
- Ventilation fans, generators, and other stationary equipment.
- Periodic underground blasting, although blasting is expected to occur at significant depth below ground surface and is not anticipated to produce measurable disturbance to wildlife at the surface under normal operating conditions.

To minimize operational disturbance:

- Vehicle speeds shall be limited on mine access roads to reduce wildlife collisions.
- Employees shall be instructed to avoid disturbing wildlife encountered during routine operations.
- Construction and maintenance activities shall avoid active raptor nests, bat roosts, or other protected wildlife habitat where required by applicable permit conditions or agency direction.
- Equipment shall be maintained in good working order to minimize unnecessary noise.
- Disturbance associated with routine operations shall be monitored through wildlife observations and adaptive management measures described in this WICP.

3.9 Secondary Chemical Exposure

Wildlife may be indirectly exposed through consumption of vegetation, insects, or prey species affected by herbicide application, pesticide use, or rodent control activities.

Mitigation:

- Use EPA-approved products
- Comply with label requirements
- Minimize application areas
- Avoid unnecessary treatments

4.0 NUMERIC TRIGGER THRESHOLDS (ACTION LEVELS)

This section establishes quantitative and observational thresholds that trigger mandatory response actions under Section 5.0. These thresholds are directly tied to wildlife exposure pathways and applicable New Mexico water quality standards and are structured to ensure rapid escalation of response proportional to risk.

Tier 1 – Observation Trigger is activated upon visual or sensory indicators of potential contamination, including wildlife presence within 100 meters of a release, or detection of sheen, discoloration, or odor.

Tier 2 – Chemical Trigger is activated when water quality parameters exceed protective thresholds, including pH outside the range of 6.5–9.0, or presence of hydrocarbons.

Tier 3 – Biological Trigger represents confirmed impact conditions, including injured or deceased wildlife, behavioral distress, or evidence of ingestion.

Activation of any trigger tier requires immediate implementation of corresponding response actions outlined in Section 5.0 and, where applicable, facility-specific measures described in Section 8.0.

4.1 Immediate Actions (0-4 Hours)

Upon identification of a release or trigger condition, the operator shall immediately initiate source control, containment, and area isolation measures, if safe to do so. A minimum 100-meter buffer shall be established, and appropriate containment systems deployed. Concurrently, regulatory notifications shall be made to NMED, MMD, USFS, and NMDGF in accordance with reporting obligations outlined in Section 9.0.

If injured wildlife is encountered, personnel shall immediately contact the New Mexico Department of Game and Fish and an appropriately licensed wildlife rehabilitation facility for guidance. Wildlife shall only be handled by trained personnel or individuals authorized by applicable agencies.

- Stop and contain discharge source, if safe to do so
- Isolate affected area (minimum 100 m buffer)
- Deploy containment (berms, absorbents, shutoff valves)
- Initiate agency notification:
 - NMED
 - MMD
 - USFS
 - NMDGF

4.2 Wildlife Protection Measures

Physical exclusion measures, including temporary fencing and deterrent systems, shall be implemented to prevent wildlife access. Contaminated water shall be removed where feasible, and alternative water sources provided if necessary. Habitat disturbance shall be minimized, particularly in sensitive areas identified in Section 2.3.

Physical Controls

- Install temporary exclusion fencing
- Cover or net ponds where feasible
- Use visual/acoustic deterrents for birds and mammals

Water Protection

- Pump and remove contaminated water
- Provide alternate clean water sources if necessary

Habitat Protection

- Restrict access to nesting cliffs and woodland breeding zones
- Suspend or modify disturbance activities when federally listed species, Forest Service Focal Species, Species of Conservation Concern, active raptor nests, bat maternity colonies, or other protected wildlife identified through project biological surveys are present within applicable avoidance buffers established by the U.S. Forest Service or U.S. Fish and Wildlife Service.

4.3 4.2.1 Wildlife Surveys

Prior to construction and during operations, wildlife surveys will be conducted as required by permit conditions, the Biological Assessment, applicable USFS direction, and project-specific mitigation measures. Surveys may include pre-disturbance nesting bird surveys, raptor nest surveys, bat habitat assessments, and other surveys requested by the USFS.

4.4 Species-Specific Measures

Species-specific protections shall be implemented in coordination with applicable agencies. Raptors shall be protected through establishment of buffers and operational restrictions. Bat habitats shall be secured to prevent disturbance, and ungulate exposure pathways mitigated through removal of contaminated water and monitoring of forage areas.

Raptors (Golden Eagle, Peregrine Falcon)

- Establish **0.5-mile buffer** around active nests
- Suspend noisy operations if disturbance observed
- Coordinate with USFWS if nesting affected

Bats

- Restrict access to mine openings
- Avoid nighttime disturbance during response

Ungulates (Elk, Mule Deer)

- Remove contaminated water sources immediately
- Following a release, wildlife observations shall focus on known wildlife travel corridors, grazing areas adjacent to disturbed lands, water sources, and habitat features identified in baseline biological studies.

5.0 MONITORING AND SAMPLING

Monitoring protocols ensure verification of containment effectiveness and assessment of wildlife impacts. These measures support adaptive management as described in Section 8.1.9.

5.1 Environmental Monitoring

Depending on the nature of the release, sampling may include water, soil, and sediment analyses for parameters including pH, total dissolved solids, metals, and hydrocarbons. Sampling locations shall prioritize drainage pathways and areas of known wildlife use.

- Water sampling (pH, TDS, metals, hydrocarbons)
- Soil sampling in spill footprint
- Sediment sampling in arroyos and drainage channels

5.2 Wildlife Monitoring

Daily wildlife surveys shall be conducted during active incidents, including carcass searches within a 500-meter radius and behavioral observations. Findings shall be documented and incorporated into reporting requirements under Section 9.0.

Monitoring records shall be maintained throughout the life of the project and made available to the U.S. Forest Service upon request. Annual summaries of wildlife observations, incident investigations, corrective actions, and adaptive management measures shall be provided as part of project environmental compliance reporting.

- Daily surveys during active incident
- Carcass searches within **500 m (~0.25 mile) radius**
- Behavioral observation logs

6.0 DISCHARGE PIPELINE CORRIDOR CONTINGENCY

This section addresses risks associated with the discharge pipeline corridor extending from the mine to the Rio San Jose near the village of Milan. Preventative measures include installation of automatic shutoff valves and routine inspections. In the event of a rupture, affected segments shall be isolated immediately, downstream containment deployed, if safe to do so, and wildlife surveys conducted along a minimum 500-meter corridor. Response actions shall align with Sections 5.0 and 6.0.

Specific to the Discharge Pipeline Corridor along Highway 605 to the village of Milan, NM:

- Install automatic shutoff valves at critical nodes, where possible
- Conduct daily visual inspections during operation

In the event of rupture:

- Isolate segment within **as soon as possible**
- Deploy downstream containment barriers, if safe to do so
- Survey **minimum 500-meter corridor** for wildlife impacts

7.0 FACILITY-SPECIFIC WILDLIFE PROTECTION MEASURES

7.1 Water Treatment Plant (in Section 17) and Lined Pond Systems (in Sections 16 and 17)

Facilities located in Sections 16 and 17 present elevated wildlife exposure risks and require enhanced controls. These measures supplement and are consistent with Sections 4.0 and 5.0.

7.1.1 Purpose

This section establishes **facility-specific wildlife protection requirements** for:

- The **Water Treatment Plant (WTP)** located in Section 17
- Associated **lined treatment and discharge ponds**
- **Lined ponds located downgradient of waste rock stockpiles** in Sections 16 and 17

These facilities present **elevated wildlife exposure risk** due to:

- Presence of treated or untreated process water
- Potential chemical constituents (e.g., elevated TDS, metals, treatment reagents)
- Attractiveness as open water sources in an otherwise arid environment

7.1.2 Risk Characterization

Risks include ingestion, contact exposure, and attraction of wildlife to open water sources. These risks are amplified in arid environments.

(A) Water Treatment Plant – Section 17

The WTP includes:

- Treatment systems
- Surge and discharge holding ponds
- Process water conveyance systems

As shown in Section 17 facility layouts (Figure 3b), these components are co-located with operational infrastructure and represent **point-source exposure risks**.

Primary wildlife risks include:

- Direct ingestion of treated or partially treated water
- Contact exposure at pond margins
- Attraction of avian species (including raptors and migratory birds)
- Secondary poisoning through prey exposure

(B) Lined Ponds Below Waste Rock Stockpiles – Sections 16 and 17

These ponds are designed to:

- Capture contact stormwater runoff
- Retain sediment and dissolved constituents from stockpiles

However, they present:

- **Persistent open water features**
- Potential accumulation of dissolved solids and metals
- Wildlife attraction during dry periods

Runoff pathways align with **natural drainage features (arroyos)** identified in baseline studies, increasing the likelihood of wildlife interaction.

7.1.3 Mandatory Design Controls (Engineering Requirements)

Engineering controls include perimeter fencing, avian deterrent systems, escape ramps, and freeboard requirements designed to prevent wildlife access and ensure containment integrity.

The following controls shall be implemented and maintained:

(A) Wildlife Exclusion Systems

All process water ponds, treatment ponds, contact water ponds, and other water sources with the potential to contain contaminants shall be enclosed by wildlife exclusion fencing designed to prevent access by large ungulates while maintaining escape opportunities for small wildlife that may inadvertently enter fenced areas.

- **Perimeter fencing** (minimum 6-foot height) around all WTP ponds and lined stockpile ponds
- Fencing shall:
 - Prevent ungulate access
 - Include small-mammal exclusion mesh (≤ 2 -inch spacing at base)
- **Gates shall remain closed and locked** when not in active use

(B) Avian Protection Measures

- Install **full or partial pond netting systems** where feasible
- Where netting is not feasible:
 - Install **overhead wire grids or deterrent lines**
 - Deploy visual deterrents (flagging, reflective devices)

Special emphasis shall be placed on:

- Preventing use by raptors
- Minimizing attraction to migratory birds (MBTA compliance)

(C) Escape and Egress Features

- Install **wildlife escape ramps** at all ponds:
 - Minimum slope: 3:1
 - Surface: textured or roughened for traction
- Provide **multiple egress points** per pond

(D) Freeboard and Containment

- Maintain **minimum 2-foot freeboard** at all times
- Design capacity shall account for:
 - 100-year, 24-hour storm event
- Secondary containment shall prevent overflow into adjacent habitat

7.1.4 Operational Controls

Routine inspections, water quality management, and wildlife observation protocols shall be implemented to maintain compliance and prevent exposure events.

(A) Routine Inspection

- Daily visual inspection during operations
- Weekly documented inspections of:
 - Fencing integrity
 - Netting/deterrent systems
 - Pond water condition

(B) Water Quality Management

- Maintain water chemistry to minimize wildlife toxicity risk:
 - pH maintained between 6.5–9.0
 - Minimize hydrocarbon presence
- If exceedances occur → **Tier 2 trigger activated (Section 5.0)**

(C) Wildlife Observation Protocol

If wildlife is observed:

- Within fenced facility → immediate removal and repair of breach
- Attempting to access ponds → deploy additional deterrents
- Using pond surface → escalate to Tier 2 response

7.1.5 Facility-Specific Trigger Thresholds

Additional triggers include wildlife presence within fenced areas, observed interaction with pond water, and confirmed mortality events. These triggers escalate response requirements under Section 5.0.

In addition to Section 5.0 triggers, the following apply:

Tier 1 – Facility Interaction Trigger

- Wildlife tracks, scat, or presence within **fenced facility boundary**

- Bird perching or landing attempts observed

Tier 2 – Exposure Risk Trigger

- Wildlife observed drinking or contacting pond water
- Carcass or distressed wildlife within **200 meters of facility**
- Repeated avian attraction despite deterrents

Tier 3 – Confirmed Impact Trigger

- Wildlife mortality within facility
- Evidence of chemical exposure
- Entrapment in pond

7.1.6 Response Actions

Immediate actions include securing facilities, enhancing exclusion measures, and coordinating with agencies. Wildlife-specific response actions shall include handling, documentation, and necropsy where required.

Immediate (Tier 2 or 3)

- Secure and isolate facility
- Deploy additional exclusion measures
- Remove or cover contaminated water where feasible
- Notify agencies (NMED, MMD, USFS, NMDGF)

Wildlife-Specific Actions

- Coordinate with **NMDGF** for handling of affected wildlife
- Contact an appropriately licensed wildlife rehabilitation center for evaluation and treatment of injured wildlife when recommended by NMDGF or USFWS.
- Initiate carcass retrieval and necropsy if required
- Document species, condition, and location

7.1.7 Special Protections for Sensitive Species

Additional protections for raptors, bats, and ungulates shall be implemented, including deterrent reinforcement and minimization of attractants.

Based on baseline data:

Raptors (Golden Eagle, Peregrine Falcon)

- Immediate shutdown of attractants (standing exposed water surfaces where feasible)
- Reinforce deterrent systems within **24 hours**

Bats

- Use downward-directed, fully shielded lighting that complies with DarkSky principles. Where operationally feasible and consistent with worker safety requirements, utilize red-spectrum or other wildlife-compatible lighting to minimize disturbance to bats, migratory birds, and other nocturnal wildlife.
- Minimize nighttime disturbance at WTP

Ungulates (Elk, Mule Deer)

- Maintain strict fencing integrity
- Provide alternate water sources if necessary

7.1.8 Monitoring and Reporting

Facility-specific monitoring data shall be incorporated into reporting requirements outlined in Section 9.0.

- Include facility-specific monitoring in WICP reporting (Section 9.0)
- Maintain logs of:
 - Wildlife observations
 - Fence breaches
 - Deterrent effectiveness

7.1.9 Long-Term Adaptive Management

Repeated wildlife interaction shall trigger design modifications, including netting upgrades and automated deterrent systems.

If repeated wildlife interaction occurs:

- Upgrade to **full netting coverage**
- Modify pond design (steeper sides, reduced surface area)
- Install **automated wildlife deterrent systems**

7.1.10 Compliance Statement

Implementation of these measures ensures compliance with all applicable wildlife protection regulations and prevents facilities from functioning as wildlife attractants.

These measures ensure that:

- Wildlife exposure pathways associated with **WTP operations and stockpile runoff ponds** are **actively controlled**
- Facilities do not function as **attractive nuisances** to wildlife
- The project remains in full compliance with:
 - **NMAC 19.10.6.602.D(15)(d)**
 - **MBTA and BGEPA**
 - **USFS biological resource protection requirements**

8.0 REPORTING AND DOCUMENTATION

All incidents shall be documented and reported in accordance with regulatory requirements. Initial notifications shall occur within 24 hours, followed by a comprehensive report within 7 days detailing cause, extent, wildlife impacts, and corrective actions.

Within 24 hours:

- Initial incident report to agencies

Within 7 days:

- Full incident analysis including:
 - Suspected Cause and volume of release
 - Area impacted
 - Wildlife affected
 - Corrective actions

9.0 RECLAMATION AND RESTORATION

Post-incident reclamation shall include removal of contaminated materials, regrading, revegetation shall utilize certified weed-free native seed mixes appropriate for the ecological site and approved by the U.S. Forest Service, unless otherwise authorized, and restoration of habitat function. Monitoring shall continue for a minimum of two years to ensure recovery and effectiveness of mitigation measures.

- Removal of contaminated soils
- Regrading and revegetation using certified weed-free native seed mixes appropriate for the ecological site and approved by the U.S. Forest Service, unless otherwise authorized
- Restoration of habitat function (especially woodland interface zones)
- Long-term monitoring (minimum 2 years)

Appendix D Cibola National Forest and National Grasslands Post Mining Land Use Letter



United States
Department of
Agriculture

Forest
Service

Cibola National Forest and
National Grasslands

2113 Osuna Road NE
Albuquerque, NM 87113-1001
(505) 346-3900 FAX: 346-3901

File Code: 2800/2810

Date: July 21, 2009

Roca Honda Resources, LLC,
In Care of: Juan R. Velasquez
Vice President; Government, Regulatory &
Environmental Affairs
Strathmore Minerals Corp.
4001 Office Court Drive, Suite 102
Santa Fe, NM 87507

Dear Mr. Velasquez:

As a follow up to our phone conversation of June 10, 2009, I am sending you this letter for your inclusion in your mining permit application to the New Mexico Mining and Minerals Division (NMMMD) for the proposed Roca Honda mine. The Roca Honda mine will include sections 9 and 10 in T13N R8W in McKinley County, which are on National Forest System lands, managed by the Cibola National Forest.

I understand that the NMMMD regulations require written approval from the surface owner for reclamation of the disturbed areas to the proposed post-mining land use. The Roca Honda mine proposal is to reclaim the disturbed areas in sections 9 and 10 to a post-mining land use of grazing. This proposal is consistent with the Cibola National Forest Land Management Plan for the area in which the proposed mine is located.

If you have any questions, please contact Mary Lee Dereske, Recreation, Engineering, Archeology, Lands & Minerals Staff Officer, at (505) 346-3871.

Sincerely,


For **NANCY ROSE**
Forest Supervisor

cc: Diane Tafoya, Matt Reidy



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Appendix E State of New Mexico, State Land Office Post Mining Land Use Letter



PATRICK H. LYONS
COMMISSIONER

State of New Mexico
Commissioner of Public Lands

310 OLD SANTA FE TRAIL
P.O. BOX 1148
SANTA FE, NEW MEXICO 87504-1148

COMMISSIONER'S OFFICE

Phone (505) 827-5760

Fax (505) 827-5766

www.nmstatelands.org

October 8, 2009

Juan R. Velasquez
Strathmore Resources U.S. Ltd.
4001 Office Court Drive, Suite 102
Santa Fe, NM 87507

Re: State of New Mexico General Mineral Lease No. HG-0036-02 – Roca Honda Resources, LLC

Dear Mr. Velasquez:

Thank you for informing the State Land Office of your plans to submit a permit application to the New Mexico Mining and Minerals Division for a new mine at the Roca Honda Resources (RHR), LLC project. We understand that the project includes Section 16, Township 13 North, Range 08 West in McKinley County, a state-leased parcel of land to which RHR holds the mineral lease pursuant to General Mining Lease number HG-0036-02. Further, we are aware that your permit application will propose reclamation of the mine to a post-mining land use of grazing and that EMNRD requires our approval for reclamation to that proposed post-mining land use for the aforementioned lease.

According to 19.2.2.24 NMAC, a reclamation plan, consisting of the mining permit or other authorization and any other supplemental requirements deemed necessary by the Commissioner must be reviewed and approved by the Commissioner of Public Lands and shall be incorporated into the lease. Please be sure and send a copy of these documents to the State Land Office when submitting them to EMNRD so that the Commissioner may participate in the process as required in 19.2.2.25 NMAC.

The historic surface use of Section 16 is grazing. The surface grazing lease is currently held by the Fernandez Land Company. Please be advised that the State Land Office concurs with and approves RHR's proposal to reclaim the area of Section 16 disturbed by its mining operation to a post-mining land use of grazing. We believe that such reclamation is consistent with historic and anticipated future use. If you have any questions please feel free to call Michael Mariano, Minerals Manager at (505) 827-5750.

Sincerely,


Jami Bailey, Director
Oil, Gas, and Minerals Division

JB/mm

Cc: John Pheil, EMNRD

-State Land Office Beneficiaries -

Carrie Tingley Hospital • Charitable Penal & Reform • Common Schools • Eastern NM University • Rio Grande Improvement • Miners' Hospital of NM • NM Boys School • NM Highlands University • NM Institute of Mining & Technology • New Mexico Military Institute • NM School for the Deaf • NM School for the Visually Handicapped • NM State Hospital • New Mexico State University • Northern NM Community College • Penitentiary of New Mexico • Public Buildings at Capital • State Park Commission • University of New Mexico • UNM Saline Lands • Water Reservoirs • Western New Mexico University

Appendix F Post Mine Radiological Surveys Plan



SENES Consultants Limited
Specialists in Energy, Nuclear and Environmental Sciences

Post Mine Radiological Surveys

Addendum to Roca Honda Mine Reclamation Plan (Rev. 1)

Mine Permit No. MK025RN

McKinley County, New Mexico

Prepared for:

Roca Honda Resources, LLC
4001 Office Court, Suite 102
Santa Fe, NM 87505

Prepared by:

SENES Consultants Limited
8310 South Valley Highway, Suite 3016
Englewood, CO USA 80112

March, 2013

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1.0 INTRODUCTION

Roca Honda Resources, LLC ("RHR") has submitted a Mine Reclamation Plan (Revision 1) for the proposed Roca Honda underground uranium mine ("Site") in McKinley County, New Mexico (RHR, 2011a). As part of the agency review process, the New Mexico Mining and Minerals Division ("MMD") and New Mexico Environmental Department ("NMED") have indicated the need for a post mine radiological survey following removal of all structures, stockpiles and equipment from the site to "demonstrate that the operation has not resulted in radiological conditions that may impact human health and safety beyond the conditions existing prior to mining" (MMD, 2012). Pre-mining radiological baseline conditions were characterized with a radiological survey conducted in 2010 by DeNuke Contracting Services, Inc. ("DeNuke"). Results were presented in Section 13 of the Baseline Data Report (RHR, 2011b).

The purpose of this document is to provide:

- A radiological survey plan to identify, quantify and characterize the locations and spatial extent of post-mine radiological contamination that may exist once mining operations are complete and reclamation commences.
- A measurement protocol to help guide excavation and removal of contamination, as may be necessary, and to ensure that the post-reclamation radiological verification surveys confirm that reclamation objectives have been met.
- A post-reclamation radiological verification survey plan to verify and demonstrate that post-reclamation conditions are consistent with pre-mining baseline conditions and that the operation has not resulted in radiological conditions that may impact human health and safety beyond conditions existing prior to mining.
- Individual cost estimates (in current dollar amounts) for implementation of each of the radiological survey component plans.

The MMD and NMED have indicated that the procedures to be used and radiological parameters to be tested for this radiological survey should be consistent with the pre-mining baseline radiological survey. The intent is to ensure that comparisons are valid and that they can be used to demonstrate spatial and quantitative consistency between post-reclamation radiological conditions and pre-mining radiological baseline conditions. Achieving and demonstrating post-reclamation consistency with baseline radiological conditions will involve a three-stage radiological survey process, with each stage sequenced to occur at specific points in the Mine Reclamation Plan schedule (RHR, 2011a). The nomenclature, general descriptions, sequencing, and the corresponding sections of this document in which the detailed plans for each stage of the radiological survey process are provided are as follows:

1. Post-mining, Pre-Remediation Radiological Survey (Section 2.0): Once mining operations have been completed and primary structures and equipment have been removed from the Site [per sections

2.2.1 – 2.2.7 of the Mine Reclamation Plan (RHR, 2011a)], gamma surveys will be conducted across disturbed and accessible land areas to identify and characterize the extent of residual radiological contamination that may have been caused by the mining operations. This information will be used to determine the horizontal extent of remediation necessary to achieve consistency with baseline radiological conditions.

2. Remedial Support Measurements (Section 3.0): To guide remediation of areas identified to contain residual contamination as identified by step one above, real-time gamma measurements will be performed to determine when soil excavations have achieved consistency with baseline radiological conditions. These measurements will be used to guide excavations prior to any re-grading/contouring activities [per section 2.2.8 of the Mine Reclamation Plan (RHR, 2011a)].
3. Post-Reclamation Verification Survey (Section 4.0): A final “post-reclamation” verification survey will be performed after remediation is deemed complete and re-grading/contouring has been conducted [per sections 2.2.8-2.2.9 of the Mine Reclamation Plan (RHR, 2011a)], but prior to topdressing, seeding and mulching activities [per section 2.2.10 of the Mine Reclamation Plan (RHR, 2011a)] which could be negatively affected by radiological survey activities.

Individual cost estimates for implementation of each stage of the radiological survey process as indicated in items 1, 2, and 3 are provided in Section 5.0 of this document. Section 6.0 details the data quality assurance/quality control methods and protocols that will be used to help minimize and quantify data uncertainty. Information concerning the technical basis and scientific rationale for the approaches and methods that will be used for each stage of the radiological survey process, how these approaches/methods will produce radiological survey data that are compatible with the baseline data set provided in the Baseline Data Report (RHR, 2011b), and the technical basis for how these data will be evaluated to demonstrate consistency with baseline conditions, are provided in Section 7.0 of this document.

In addition, Section 7.0 provides information regarding additional radiological baseline measurements and sampling that will be performed onsite in the spring of 2013 in order to supplement and improve the overall future utility of the radiological baseline data set provided in the Baseline Data Report (RHR, 2011b). The supplemental onsite radiological survey data to be collected, and how these data will be used to update existing radiological baseline data, are detailed in Section 7.0. The results of these supplemental onsite radiological baseline survey data, and related revisions to existing radiological baseline data and/or respective data presentations, will be provided (anticipated summer 2013) as an addendum to Section 13 of the 2011 Baseline Data Report (RHR, 2011b).

It will also be necessary to supplement the Baseline Data Report (BDR) by collecting data along the portions of the proposed haul road corridors in Sections 11 and 17 that have changed, the utility corridor in Section 15, and the corridor of the mine dewatering pipeline that will convey treated water a distance of approximately 8 miles from the water treatment plant. Baseline radiological conditions will be established along these routes. This will include a gamma survey and representative soils sampling in

accordance with the methods described in Sections 2.2.3, 4.2.3, 4.2.4 and 7.2 of this document. The results of the survey will also be included in the above referenced addendum to Section 13 of the 2011 Baseline Data Report (RHR, 2011b).

2.0 POST-MINING, PRE-REMEDATION RADIOLOGICAL SURVEY

This section provides the technical basis, rationale and general approach, along with specific methods and procedures that will be used to identify and characterize the locations and spatial extent of radiological contamination upon final closure of the mine operations and removal of surface facilities, but prior to any remediation of disturbed land areas. Cost estimates are provided in Section 5.0. For the purposes of this plan, “contamination” refers to any area of significant horizontal extent where radiological conditions can be clearly identified to exceed pre-mining baseline conditions. This definition is based on MMD’s requirement that RHR demonstrate that its mining operation has not resulted in conditions that may impact human health and safety beyond the conditions that existed prior to mining (MMD, 2012). The caveat of “significant horizontal extent” is important with respect to the above definition of contamination for a number of reasons as discussed below.

As indicated in Section 1.0, the overall radiological survey process is designed to help achieve, and ultimately to demonstrate, consistency with pre-mining baseline conditions. An important challenge when the remedial objective is essentially to remediate to pre-existing background levels, is to do so without causing unnecessary collateral damage to the environment and/or without creating new and unintended risks to human health and safety. Cleanup of very low levels of contamination can result in significant environmental degradation without corresponding reductions in human health risks (Whicker et al., 2004). Disturbing/mobilizing soils with low-level contamination can actually increase the potential for human exposures (via inhalation/ingestion pathways) and more generally, can negatively impact overall air and water quality in the vicinity of the site. Such remediation also unnecessarily increases the extent to which remediation workers are exposed to physical hazards.

Federal standards for radiation protection (e.g. 10 CFR 20, 40 CFR 192) are set at increments above background levels (e.g. 25 mrem/yr, 5 pCi/g radium-226, 20 µR/hr, etc.). These standards are based on recommendations from the International Commission on Radiological Protection (ICRP) and the National Council on Radiation Protection (NCRP), and are respectively considered to be well below levels that could result in significant or measurable detriment to human health. Moreover, ICRP recommendations explicitly include the concept that any remedial action should do more “good than harm” (ICRP, 1990). In addition, many locations in the U.S. and abroad have levels of naturally occurring background radiation that are much higher than baseline levels at the Roca Honda Site, yet human health effects have never been demonstrated in epidemiological studies of populations living in such areas (Boice et al., 2010; Hall and Giaccia, 2006). The biological effects of exposure to radiation do not depend on whether the source is naturally occurring or a result of human activities. For all of the above reasons, a caveat concerning “significant horizontal extent” has been included in the definition of contamination for the purposes of this radiological survey plan. Remediating areas that are too small and/or too low level to realistically result in radiological impacts to human health could cause more harm than good.

The MMD and NMED have indicated that the post mine radiological surveys should, at minimum, include the footprint of the facility, areas around shafts and ore bays, beneath impoundments, the pipeline corridor, and the haulage routes within the permit area (MMD, 2012). These areas will be included in pre-remediation surveys, as well as in post-reclamation verification surveys (Section 4.0).

2.1 Technical Basis, Rationale and General Approach

As previously indicated, the stated objective for the radiological survey is to demonstrate that final radiological conditions at the Site will not impact human health and safety beyond conditions that existed prior to mining (MMD, 2012). General consistency with pre-mining baseline conditions is an achievable remedial goal that can be adequately demonstrated with radiological surveys. The primary remedial challenge is to achieve consistency with baseline conditions without creating unnecessary environmental degradation and/or new and unintended increases in risks to human health and safety.

Any radiological contamination due to mining operations at the Site will be limited to naturally occurring radioactive materials including uranium ore and proto-ore, or slightly mineralized non-economically mineralized mine development rock. In addition to uranium, these radioactive constituents can include variable amounts of natural thorium (Th-232) and potassium (K-40), all of which have associated gamma radiation emissions (primarily from decay series products).

As such, gamma surveys will be the primary method used to identify and characterize areas of contamination prior to any remediation that may be required to achieve consistency with baseline radiological conditions. The results of these gamma surveys will be compared against a baseline gamma survey map in corresponding areas (see Figure 10, Section 7.3) for evidence of contamination relative to pre-mining baseline conditions. Determination of "contamination" based on such comparisons requires consideration of uncertainty in gamma survey measurements. There are three basic sources of such uncertainty:

1. Instrument variability. This includes variations in response characteristics between different gamma detectors used for scanning, and temporal variability in the performance of individual detectors.
2. Natural temporal variability in gamma radiation at any given location. Radioactive decay is a random probabilistic process that follows a binomial distribution. As a result, gamma exposure rates at a given location will naturally vary somewhat from one second to the next. Across longer time scales, diurnal and seasonal fluctuations in the concentrations of gamma-emitting radon decay products in air near the ground surface can occur due to changes in air stability and/or changes in soil moisture, changes in soil moisture can affect shielding of terrestrial sources of gamma radiation, and changes in barometric pressure can affect atmospheric shielding of cosmic sources of radiation.
3. Spatial variability in terrestrial sources of gamma radiation (on both large and small spatial scales). Knowledge of the spatial variability in soil radionuclides and associated terrestrial gamma radiation

is primarily limited by the density of ground coverage attained by gamma surveys. Baseline gamma survey coverage at the Site was limited to about 2% of the land area within the permit area (RHR, 2011b). On smaller spatial scales, the accuracy of GPS readings is also limiting.

The most common way to help quantify the majority of combined data uncertainty due to instrument variability and natural temporal variability (items 1 and 2 above) is to perform data quality control (QC) measurements of ambient background radiation at a fixed onsite location every day throughout the duration of the gamma survey field work. During the course of baseline gamma surveys in 2010, daily instrument function checks were performed indoors at the Grants Field Office, including ambient background measurements at a consistent indoor location (Figure 1). The data in Figure 1 were reported in units of cpm (RHR, 2011b), but have been converted here into approximate units of exposure rate ($\mu\text{R/hr}$) based on the regression equation shown in Figure 7, Section 7.1. The amount of observed variability in Figure 1 is similar to that observed for static, fixed-location QC measurements at other sites having similar levels of ambient gamma radiation and general environmental characteristics¹.

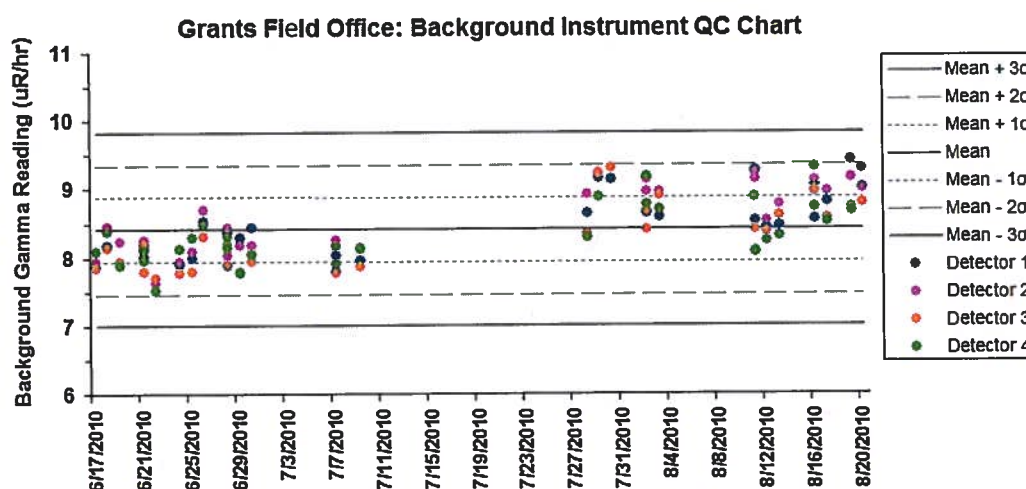


Figure 1: Variability in background QC measurements over time at the Grants Field Office for detectors used for gamma scanning at the Site (raw data extracted from RHR, 2011b, converted into units of approximate background exposure rate).

The data in Figure 1 provide a reasonable indication of the uncertainty likely to be present in the baseline gamma survey data set due to instrument variability, combined with natural fluctuations in background radiation, at any given location. The overall range of these measurements (approximately $\pm 2 \mu\text{R/hr}$) suggests that any future measurements at the Site would need to exceed indicated baseline values in corresponding locations by more than $2 \mu\text{R/hr}$ in order to be considered evidence of potential contamination.

¹ This observation is based on numerous gamma surveys conducted by SENES personnel with the same type of instrument (Ludlum 44-10 detectors) at various sites in nearby western States (CO, UT, WY).

However, baseline scan data were obtained outdoors at the Site, were recorded while in motion, and the reproducibility of the exact location for each individual scan reading has some associated uncertainty. QC measurements repeated daily to test operational scan systems performance while actually scanning along a designated “field strip” (see Section 6.0) can demonstrate considerable additional variability due to small spatial differences in actual scan tracks, moving system performance, and temporal variations due to outdoor environmental factors² (Figure 2). The example field strip data in Figure 2 illustrate overall scan system variability in the field at a large site in Wyoming (approximately $\pm 6 \mu\text{R/hr}$), which is about twice that which can be expected at the Roca Honda Site as average ambient background gamma radiation levels at the Roca Honda Site are about half that of the Wyoming site (numerical differences in readings between different detectors are generally proportional to the strength of the gamma field). Based on this observation, along with observations of scan system performance at other sites having relatively low levels of ambient background gamma radiation (e.g. less than $15 \mu\text{R/hr}$), overall scan data uncertainty at a given location along any given scan transect at the Rocha Honda Site is expected to be about $\pm 3 \mu\text{R/hr}$.

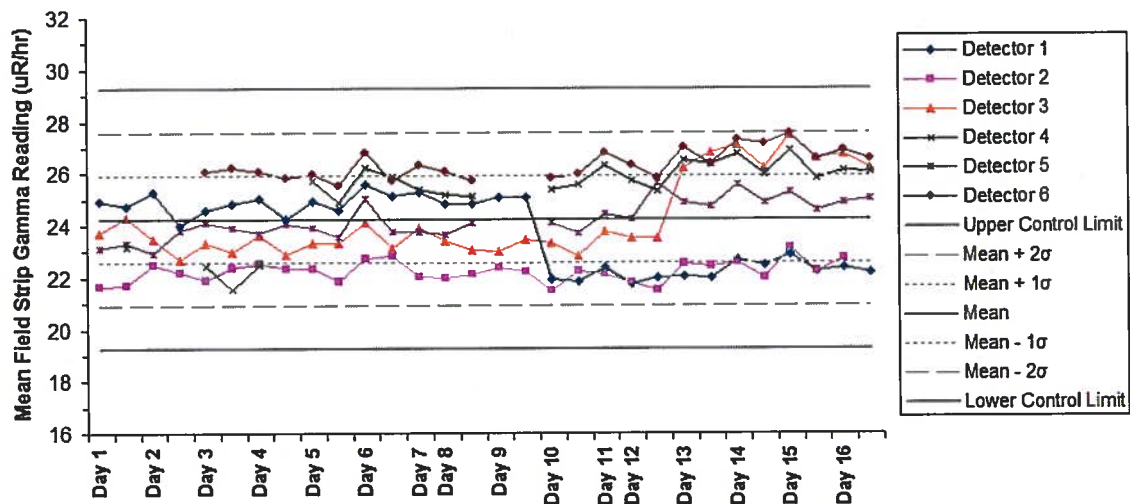


Figure 2: Example daily operational “field strip” scan system QC chart developed during the course of a large baseline gamma survey project in Wyoming. This particular example was chosen due to the unusually long duration of the project and greater amount of field strip data.

In addition to the above sources of data uncertainty, uncertainties associated with spatial variability in between scan transects must be also be considered. Because baseline gamma survey transects were spaced 50 meters apart, inferred (interpolated) baseline values in between these transects may not be accurate. Smaller-scale spatial variability in baseline values within these scan coverage gaps could potentially exceed interpolated estimates by more than $3 \mu\text{R/hr}$, be mistakenly identified as

² On a diurnal basis, outdoor concentrations of gamma-emitting radon decay products in air are likely to be somewhat more variable versus indoor environments, particularly in the summer months, and outdoor temperature variations can slightly affect detector response.

contamination, and lead to cleanup of uncontaminated background soils. To help address spatial uncertainty when comparing future gamma measurements against baseline gamma survey data, a more generalized approach for evaluation of consistency with baseline will be used.

As previously indicated, a reasonable and achievable remedial objective is to excavate all clearly identifiable areas of contamination, yet to the greatest extent possible, avoid the potential to create unintended risks to human health and/or unwarranted environmental degradation by remediating low levels of contamination that may slightly exceed baseline readings at a given location, but do not exceed the degree of uncertainty associated with baseline gamma measurements at that location (the location itself will be somewhat uncertain as GPS data have some degree of associated error). Rather than attempting to draw conclusions about potential contamination based on individual measurements at any given location within the areas specified by MMD and NMED (MMD, 2012), recorded gamma surveys will be conducted across these areas and beyond³ such that more generalized technical assessments can be performed using an approach that will help to minimize erroneous conclusions about contamination due to overall quantitative and spatial uncertainties in baseline gamma survey data.

Recorded gamma surveys will be conducted using modern technologies and methods that have become standard practice for characterization and remedial applications (e.g. Johnson et al., 2006; Meyer et al., 2005a and 2005b; Whicker et al., 2006 and 2008). This includes use of GPS-based gamma scanning systems with automated electronic data acquisition software and associated methods for data collection, mapping and interpretation. Scanning detectors will be mounted on all-terrain vehicles (ATVs) and/or backpacks at 3 feet above the ground surface (see Sections 2.2.3, 4.2.3 and 7.0).

The density of scan transects (Section 2.2.2) will be increased relative to that used for baseline gamma surveys to help reduce uncertainty related to spatial variability in between scan transects (the target scan transect width will be reduced to 20 meters, which at a 3-foot detector height, will increase the effective ground coverage to about 20%). The resulting data will be plotted in ArcGIS, and data interpolation by kriging will be performed (see Section 2.2.5) to produce a pre-remediation characterization map similar to the baseline gamma survey map (see Figure 10, Section 7.3). This will allow larger-scale spatial differences between pre-mining baseline conditions and pre-remediation conditions to be compared directly.

Interpolation by kriging tends to “smooth out” smaller-scale variability along scan transects and allows more effective interpretation of larger-scale spatial distributions of gamma radiation. Moreover, uncertainty in both baseline and post-mining gamma survey data due to unknown spatial variability between scan transects is somewhat “normalized” by kriging. Comparative use of kriged gamma survey maps to identify contamination will allow identification of contamination across any given area large

³ A reasonable amount of margin (e.g. 50-100 meters) beyond these areas will also be scanned, with exact widths to be determined in the field based on potential for migration of contamination due to erosional transport mechanisms.

enough to be of potential radiological significance with respect to human health⁴, yet will also minimize the potential to create new and unintended risks to human health and/or collateral environmental damage by avoiding unnecessary remediation. Larger-scale distributional differences between baseline and post-mining estimates of gamma exposure rates based on kriged scan data will be considered evidence of contamination if the numerical difference between corresponding averages across the area in question exceeds 3 $\mu\text{R/hr}$. This metric will be determined using spatial analysis tools in ArcGIS.

2.2 Method Specifications

Pre-remediation gamma surveys will consist of three basic elements: 1) gamma scans of areas potentially affected by mining operations, 2) instrument cross-calibration measurements for energy dependence corrections and related unit conversions to raw gamma scan data, 3) data mapping, interpolation with kriging, and spatial analysis. The technical details and relevant issues regarding these elements are described in the following sub-sections.

2.2.1 Gamma Survey Areas

Pre-remediation gamma scans will be performed across the footprint of the facility, areas around shafts and ore bays, beneath impoundments, the pipeline corridor, and the haulage routes within the permit area in accordance with MMD specifications (MMD, 2012). A reasonable amount of additional margin (e.g. 50-100 meters) will be scanned beyond these areas, with exact widths to be determined in the field based on potential for migration of contamination due to erosional transport mechanisms. For example, margins around open areas with potential for significant wind-blown migration of contamination will be wider (e.g. 100 meters) on the downwind sides of the area. Similarly, areas with potential for runoff-driven erosional transport will have wider scan margins on the hydrologically downgradient sides of the area.

2.2.2 Density of Gamma Scan Coverage

Sodium iodide (NaI) based detectors (with 2 × 2 inch NaI crystals) will be used for gamma scanning (see Section 2.2.3). All NaI detectors will be mounted on ATVs (for vehicle surveys) or backpacks (for walkover surveys) at approximately 3 feet above the ground surface during scanning. Based on previous observations and experience in the field, at this detector height, lateral NaI detector response to significantly elevated planar (non-point) gamma sources at the ground surface is estimated to be about 2 meters, giving each detector an estimated “field of view” of about 4 meters in diameter at the ground surface. This does not imply a system detector can register increased gamma readings from a small

⁴ Areas smaller than the distance between gamma scan transects (e.g. < 50 meters in diameter) with exposure rates elevated by as little as 3 $\mu\text{R/hr}$ above baseline will not realistically pose health risks beyond the existing range of baseline levels at the Site. Baseline variability across the Site is considerably greater than such small incremental changes. For comparison, a Federal gamma radiation cleanup standard for inactive uranium processing sites is 20 $\mu\text{R/hr}$ above background levels (40 CFR 192, Part B). (See Section 2.0 for additional relevant information).

point source 2 meters away, but does indicate that scattered photons from larger, more radiologically significant, elevated source areas (e.g. 100 m²) are likely to be detected at that distance.

The goal for ground scan coverage will be on the order of 20% for impact characterization surveys, meaning a distance between adjacent scan transects of about 20 meters. Practical considerations such as safety, terrain, and natural obstructions will dictate actual distances that can reasonably be maintained between adjacent scan transects. In terrain deemed unsafe for ATV scanning, efforts will be made to scan as closely as possible along the perimeters of such terrain, and/or walking surveys with a backpack mounted system will be performed. Scanning speeds will typically range between 1 and 5 mph depending on the roughness of the terrain and mode of scanning.

Scan data will be downloaded daily into a project database and plotted on preliminary maps to assess adequacy of scan coverage and screen the data for evidence of elevated gamma exposure rates. Wherever possible, areas identified to have notably higher levels of terrestrial gamma radiation will be re-scanned at higher density scan coverage (e.g. 5-10 meter transects) in order to better define the spatial distribution and horizontal extent of the elevated readings.

2.2.3 Scanning Protocols, Instrumentation and System Specifications

All NaI detectors will be mounted on ATVs (for vehicle scanning) or backpacks (for walkover scanning) at approximately 3 feet above the ground surface during scanning (see Section 4.2.3 for additional details, and Section 7.0 regarding the technical basis for these specifications). For ATV-mounted systems, detectors will be mounted as far as practicable away from the vehicle (e.g. 2-3 feet) to minimize any shielding effects from the ATV (potential for shielding effects is negligible for backpack scanning). The GPS receivers will be mounted with a clear view of the sky during scanning. Each scanning system will be coupled to a field computer with appropriate data acquisition software. The mounting system configuration may be modified to suit site conditions, but detector height will be maintained as specified and the functionality of the basic system will not change.

All detectors used for gamma surveys will be properly calibrated within a year prior to use in the field, and daily quality control (QC) measurements will be performed to document proper instrument function, temporal variability, variability between instruments, and to provide quantitative information on data precision and uncertainty (see Section 6.0). Base maps showing specified scan areas (Section 2.2.1) and relevant Site features should be loaded on field computers with GPS-based tracking software to help guide the scanning and ensure coverage across all intended survey areas. This will also help to minimize trajectory overlap and ensure adequate scan density coverage.

Ludlum Model 44-10 NaI detectors will be used for all gamma scanning. This instrument is the most commonly used NaI detector for large-area gamma surveys. The Ludlum 44-10 is a separate probe comprised of a 2"x2" NaI crystal and photomultiplier tube. This probe has proven to be a reliable and durable field instrument over many decades and has long been considered an industry standard. Each 44-10 detector will be paired with either a Ludlum Model 2350 rate meter, or a Model 2221 scaler/rate

meter, equipped with RS232 data output capability. Each detector/rate meter system will be programmed to integrate gamma counts every one second and provide corresponding readings in units of $\mu\text{R/hr}$ or cpm as data output through a RS232 serial port. Each detector/rate meter pairing will have been properly calibrated against a Cs-137 source within one year prior to use for the survey (digital copies of calibration certificates will be kept on file in the project records).

Each scanning system will utilize a WAAS enabled GPS receiver to provide GPS readings (latitude, longitude) every one second to pair with each individual gamma reading. Data acquisition will involve appropriate software installed on a portable field computer or on an appropriate alternate type of data logging device. Scan data will be downloaded daily into a project database and plotted on maps to assess adequacy of scan coverage on a daily basis and to help identify any problems that may have occurred with data acquisition.

2.2.4 Instrument Cross-Calibration Measurements

Gamma exposure rates measured by Ludlum 44-10 NaI detectors are only relative measurements as response characteristics of NaI detectors are energy dependent (Figure 3). True gamma exposure rates are best measured with a less energy dependent system that exhibits relatively "flat" response characteristics across the energy range of primary interest such as a Micro-Rem Meter or RadEye PRD from Thermo Scientific. For terrestrial radiation at uranium recovery sites, this range of interest is generally below the photon emission energy of Cs-137 [662 kilo-electron volts (keV)]. Cesium-137 is the most commonly used source for instrument calibrations. The majority of terrestrial gamma radiation at uranium recovery sites is comprised of scattered photons with kinetic energies well below 662 keV and as a result, Ludlum 44-10 NaI detectors will generally overestimate true gamma exposure rates (Figure 3).

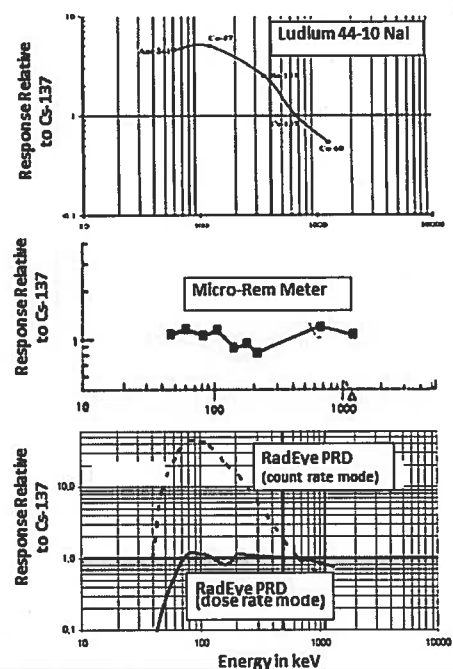


Figure 3: Energy response curves for Ludlum 44-10 NaI detector, a Micro-Rem meter, and a RadEye PRD (both count rate mode and energy-compensated dose rate mode).

NaI systems are useful for uranium recovery sites because they can quickly and effectively demonstrate relative differences in the spatial distribution of terrestrial gamma radiation before, during and after operational phases of the project. However, unless the same equipment and scanning geometry is used for all of these surveys, which can occur over project life spans on the order of decades, it is necessary to normalize the data to a common basis of comparison. This is the primary purpose of performing cross-calibration measurements, though as indicated in Sections 7.1 and 7.2.2, conversion of any data that are provided only in units of cpm into more generally useful units of exposure rate ($\mu\text{R/hr}$) is also important.

Cross-calibration ensures that the results of future gamma scans, which may use different NaI detectors, and perhaps different detector heights, detector models, or measurement technologies, can be meaningfully compared against the results of pre-operational baseline gamma surveys. When mining operations at the Site are completed years into the future, cross-calibration measurements will be necessary.

Either of two alternative instruments can be used for cross-calibrations at the Roca Honda Site as part of the post-mining impact characterization gamma survey. As indicated above, one is a Micro-Rem Meter (a “tissue equivalent” plastic scintillometer from Thermo Scientific), and the other is a RadEye PRD, a specialized NaI detector from Thermo Scientific that has energy compensated response characteristics when used in “dose rate mode”. A comparison of energy response characteristics for the Ludlum 44-10 NaI detector, the Micro-Rem meter, and the RadEye PRD is provided in Figure 3.

For each cross-calibration instrument (Ludlum 44-10, Micro-Rem Meter and/or RadEye PRD), static measurements will be taken at 10-15 discrete locations covering a range of exposure rates representative of the site. These locations will be determined based on current and/or pre-mining baseline maps of gamma exposure rates across the Site. At each cross-calibration measurement location, 10-20 individual readings from each cross-calibration instrument will be recorded and averaged. Measurement geometry for collection of cross-calibration data will be 3 feet above the ground surface. Regression analyses will be performed on resulting values to determine statistical relationships between NaI detectors and Micro-Rem/RadEye-PRD⁵ instruments. The resulting cross-calibration equations will be used to convert raw scan data (e.g. in units of cpm) into energy corrected units of dose rate ($\mu\text{rem/hr}$) or exposure rate ($\mu\text{R/hr}$). Though technically slightly different, for practical purposes the latter two units of measure are commonly considered essentially equivalent. Modified scan data resulting from these energy dependence corrections will be mapped and kriged to represent official gamma survey results for comparisons against similarly normalized and kriged baseline gamma survey maps.

2.2.5 Spatial Analysis of Gamma Survey Data

Once all individual gamma survey data have been collected, uploaded into the project database, and converted into energy-corrected units of $\mu\text{R/hr}$, they will be plotted in ArcGIS. Appropriate color-coded increments of exposure rate will be applied to allow visual interpretation and spatial analysis. The data will be reviewed initially to insure there are no “bad” data points that can on rare occasion result from small electrical surges or interruptions, for example due to unusually jarring vibrations during scanning, or upon initial start-up of data recording. Clear outliers will be discarded from the scan database.

⁵ In addition to general low-energy dependence compensation, the RadEye PRD includes an energy discrimination algorithm to ignore the contribution of high-energy photons (> about 1.3 MeV, e.g., from cosmic sources of radiation) to the gamma field in order to measure only the exposure rate attributable to low-energy terrestrial sources of gamma radiation. As a result, two adjustments must be made to all RadEye measurement values that will be used for instrument cross calibration purposes. Technical details and formulas for these adjustments are provided in Appendix A.

Finalized gamma scan data will be mapped as individual discrete measurement points using a high quality base maps and/or aerial photos as base layers. In addition, the finalized gamma scan data will be interpolated by kriging to produce continuous estimates of gamma exposure rates across all scanned areas (consistent with the format shown in Figure 10, Section 7.3). Robust kriging software such as that included in the Spatial Analyst utility in ArcGIS will be used. Kriging is a geo-statistical interpolation procedure that fits a mathematical function to a specified number of nearest points within a defined radius to determine an output value for each location. A given "location" is represented by a cell of specified areal dimensions that may or may not include any measured data points. Values closer to the cell are given more weight than values further away and distances, directions, and overall variability in the data set are all considered in the predictive semivariogram model. Input parameters used for this application should be consistent with those used for the baseline survey data (see Figure 10, Section 7.3):

Cell size:	10 feet × 10 feet
Maximum search radius:	300 feet
Semivariogram model:	Exponential
Number of nearest data points:	10

As previously indicated, kriged maps of baseline gamma exposure rates will be compared against post-mining exposure rates to identify any significant areas of radiological contamination. To help illustrate the utility and visual effectiveness of such comparisons, example kriged gamma survey data from a site cleanup in Colorado are shown in Figure 4. In this example, the data on the left show gamma exposure rates and corresponding gamma-based estimates of soil Ra-226 concentrations prior to remediation, while the data on the right show interim changes for these radiological parameters in corresponding areas part way through the cleanup progress.

Detailed quantitative/spatial differences in radiological parameters due to cleanup progress are clearly apparent in Figure 4, even on relatively small spatial scales (e.g. to within about 10 meters in this particular example). This same approach to spatial analysis will be used not only to identify any contamination resulting from mining operations at the Roca Honda Site, but to also demonstrate consistency with baseline conditions after reclamation is complete (Section 4.0).

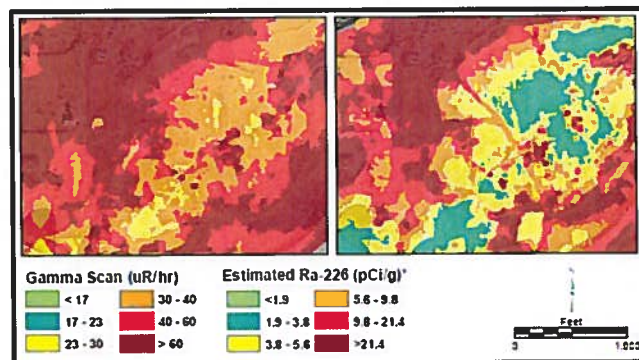


Figure 4: Example quantitative/spatial comparisons between kriged gamma survey data for a radiologically impacted site in Colorado. Left: pre-remediation gamma exposure rates and gamma-based estimates of soil Ra-226 concentrations* (e.g. see correlations, Sections 2.1 and 2.2.2). Right: corresponding interim radiological parameters part way through the cleanup.

Once a kriged map of pre-remediation gamma survey data is available for comparative spatial analysis against the kriged map of baseline gamma survey data (see Section 7.3, Figure 10), any areas of significant size, for example with horizontal dimensions greater than the range of gamma scan transect spacing (e.g. > 50 meters), that have differences in average kriged gamma data greater than about 3 $\mu\text{R/hr}$ will be delineated on maps for remedial action. The averaging used to determine such contaminated areas will be performed using spatial analysis tools and techniques in ArcGIS, and for each individual delineated area, the sum of the average baseline gamma exposure rate, plus an added value of 3 $\mu\text{R/hr}$ to account for data uncertainty, will be annotated on the pre-remediation map to serve as a remedial goal for use during remedial support surveys (Section 3.0)⁶.

These spatial assessments will require some professional judgement, for example in the event that the data suggest only slight potential contamination in relatively small areas that are well removed from primary areas of contamination, and where considerations of environmental and ecological degradation must be weighed against potential remediation that would not realistically result in corresponding reductions in human health risks, and could actually increase such risks unintentionally. Costs associated with the pre remediation survey are provided in Section 5.0.

3.0 REMEDIAL SUPPORT MEASUREMENTS

Gamma measurements for remedial support purposes will involve unrecorded interim measurements to semi-quantitatively guide the horizontal/vertical extent of excavations necessary to achieve consistency with baseline conditions. As indicated in the previous section, a map showing areas of delineated contamination (> 3 $\mu\text{R/hr}$ above average baseline in each delineated area) will be annotated such that each delineated area will show an area-specific numeric value that is equivalent to the sum of its respective average baseline value, plus an additional 3 $\mu\text{R/hr}$ to account for data uncertainty. This annotated value will be used as an area-specific remedial goal for guiding excavations within the area in question based on the real-time gamma measurements being used to assess corresponding reductions in gamma radiation.

Because all official gamma survey krig maps will be based on energy-corrected scan values, it will be necessary to utilize the same instrument used to correct raw scan data based on instrument cross-calibration measurements. In other words, if a RadEye PRD instrument, reading out in energy compensated dose rate mode (Figure 3), is used for instrument cross-calibrations (Section 2.2.4), then a properly calibrated RadEye PRD instrument should be used for real-time field assessment of remedial reductions in gamma radiation relative to the remedial goal in each area delineated for remedial action. Once remedial excavations appear to have achieved compliance with the remedial action goal based on these measurements, excavations within the area in question will be terminated pending an official inspection by the project health physicist as described below. Soils removed from each radiologically

⁶ If a RadEye PRD is used for remedial support measurements, the adjustments indicated in Appendix A should not be reflected in the remedial goal values annotated on this map. This will allow direct comparison of raw RadEye PRD readings against the remedial goal value without having to add estimated contributions from high-energy photons associated with K-40 and cosmic sources of radiation (see Appendix A).

contaminated area will be properly disposed of in accordance with the Roca Honda Mine Reclamation Plan (RHR, 2011a).

Guiding excavations based on remedial support gamma measurements is not a technically complicated activity, and can be performed by a properly trained environmental technician or remediation worker. However, a qualified and experienced environmental health physicist will oversee the project remotely, will be updated periodically throughout the cleanup regarding progress, and will provide technical advising should unusual circumstances or issues arise. Once excavations across all areas delineated for remedial action are believed to be complete based on remedial support gamma measurements, the overseeing health physicist will conduct a Site visit to perform independent measurements and develop a professional opinion as to whether post-reclamation radiological verification surveys (Section 4.0) are likely to quantitatively and spatially demonstrate consistency with baseline radiological conditions. If not, additional excavations will be performed until the project health physicist is confident that this remedial objective has been achieved. Costs for remedial support measurements are provided in Section 5.0.

4.0 POST-RECLAMATION VERIFICATION SURVEY

This section describes the radiological surveys that will be used to verify that after reclamation, radiological conditions across the site are consistent with pre-existing baseline conditions. Many of the technical bases, analytical approaches, methods and criteria described in detail for pre-remediation radiological surveys (Section 2.0) are applicable to post-reclamation verification surveys and are thus generally summarized or referenced rather than repeated in detail. Special considerations, differences or additions are discussed in this section, as is a plan for limited direct soil sampling for additional verification. Cost estimates are provided in Section 5.0.

4.1 Technical Basis, Rationale and General Approach

As previously indicated, the stated objective for post-reclamation radiological surveys is to demonstrate that final radiological conditions at the Site will not impact human health and safety beyond conditions that existed prior to mining (MMD, 2012). For the technical reasons detailed in Section 2.0, the general criterion against which post-reclamation survey data will be evaluated is “consistency with baseline conditions”. This does not imply that every atom of radiological contamination generated by mining must have been identified and removed from the Site, but does require that any residuals due to mining are too low-level to be clearly distinguishable from baseline levels and/or are too small in areal extent to be of significance with respect to potential for human exposures and related impacts (*see* Section 2.1).

All of the radionuclides that could potentially be generated by mining at the Site occur naturally in all rocks and soils. Any residual radiological contamination that may remain after reclamation will have associated gamma radiation emissions (primarily from radioactive decay series products). As a result, gamma surveys will be the primary method used to verify that post-reclamation radiological conditions are consistent with pre-mining baseline conditions. Verification of this outcome will require evidence

that residual sources of gamma radiation due to mining are not present at average levels that exceed average baseline conditions in a given area by more than the estimated amount of uncertainty inherent in gamma survey measurement data. The advantage of gamma surveys is that gamma emissions from soil radionuclides are easily detected in-situ in the field and thus, a much higher density of measurements is possible. Gamma scanning produces spatially comprehensive and reliable characterization with respect to evaluations of potential contamination from mining activities and/or consistency with baseline conditions.

The amount of uncertainty in baseline gamma scan data at any given measurement location is estimated to be about $\pm 3 \mu\text{R/hr}$ (Section 2.1). A similar amount of individual measurement uncertainty can be expected in post-reclamation verification gamma survey data. In addition, there is uncertainty associated with actual spatial variability in soil radionuclides and associated gamma radiation that exists between gamma scan transects. To help mitigate spatial sources of uncertainty, larger-scale distributional differences (e.g. differences across areas larger than 50 meters in diameter) between baseline and post-reclamation estimates of gamma exposure rates will be evaluated based on respective maps of kriged gamma scan data (see Section 2.2.5). In addition, the density of scan transects for post-reclamation gamma verification surveys (Section 4.2.2) will be increased relative to that used for baseline gamma surveys (increasing the effective ground coverage to about 20%) in order to better characterize small-scale spatial variability which can potentially be somewhat greater relative to baseline conditions once a contaminated area has been remediated.

Based on comparative spatial analysis between kriged baseline and post-reclamation gamma scan data, any areas of significant size, for example with horizontal dimensions greater than the range of gamma scan transect spacing (e.g. > 50 meters), where the average of post-reclamation krig data exceeds the corresponding average of baseline krig data by more than about $3 \mu\text{R/hr}$ will be considered inconsistent with (i.e. elevated relative to) baseline radiological conditions. In this circumstance, further remedial action may be required depending on the size of the area, the degree of exceedance, and whether a realistic potential exists for human health impacts beyond what can already be attributed to baseline radiological conditions across the Site⁷. Otherwise, the area in question will be considered consistent with corresponding radiological baseline conditions. This qualitative and quantitative spatial analysis process will be performed by a qualified environmental health physicist and professional GIS analyst using accepted health physics principles along with spatial analysis tools and techniques in ArcGIS.

In addition to comparisons of gamma exposure rates between baseline gamma surveys and post-reclamation gamma surveys, raw gamma scan data from both surveys will be converted into estimates of radionuclide concentrations in surface soils (e.g. Ra-226, U-nat) based on the results of the supplemental baseline gamma/soil radionuclide correlation study detailed in Section 7.2.2 (provided that any such correlations are shown to be statistically significant). In addition, a limited amount of direct soil sampling will be conducted in all areas potentially affected by mining operations for

⁷ Baseline gamma exposure rates across the Site generally range from 6-14 $\mu\text{R/hr}$ (see Figure 10), meaning that natural variability within the permit area is significantly greater than $\pm 3 \mu\text{R/hr}$.

post-reclamation radiological verification surveys (Section 4.2.4), with samples to be analyzed at a qualified commercial laboratory. Results will be used for general Site-wide comparisons with direct soil sampling results from the supplemental gamma/soil radionuclide study (Section 7.2.2), with soil sampling results provided in the Radiological Baseline Report (RHR, 2011b), and with any gamma-based estimates of baseline radionuclide concentrations in surface soils generated as a result of the supplemental gamma/soil radionuclide study (Section 7.2.2).

All post-reclamation radiological verification survey results, including data, maps, evaluations and conclusions will be provided in a detailed technical report (Section 4.2.5).

4.2 Methods and Specifications

Post-reclamation radiological verification surveys will consist of three basic elements: 1) gamma scans of all areas potentially affected by mining operations (Section 4.2.1) which at minimum, will mimic the areas scanned for the pre-remediation surveys (Section 2.2.1); 2) limited soil sampling and laboratory analysis (Section 4.2.4); 3) data mapping, interpolation of gamma survey data by kriging, data analysis and reporting (Section 4.2.5).⁸ The technical details and are described in the following sub-sections.

4.2.1 Gamma Survey Areas

Post-reclamation gamma verification scans will be performed across the footprint of the facility, areas around shafts and ore bays, beneath impoundments, the pipeline corridor, and the haulage routes within the permit area. As with pre-remediation gamma scans, a reasonable amount of additional margin (e.g. 50-100 meters) will be scanned beyond these areas (*see* Section 2.2.1). Depending on additional information and Site knowledge that may be acquired during the pre-remediation survey and remedial support measurement activities, additional areas may need to be scanned to ensure that the final post-reclamation radiological status of the Site can be verified as being consistent with baseline radiological conditions on a Site-wide scale (and beyond the permit area as applicable).

4.2.2 Density of Gamma Scan Coverage

As with pre-remediation surveys, the goal for ground scan coverage will be on the order of 20% for post-reclamation gamma verification surveys, meaning a distance between adjacent scan transects of about 20 meters. Considerations and limitations regarding scan coverage are discussed in Section 2.2.2. If

⁸ Instrument cross-calibration measurements are not listed here as it is assumed that the amount of time elapsed between pre-remediation surveys (Section 2.0), remedial support activities (Section 3.0), and initiation of post-reclamation verification surveys (Section 4.0) will be relatively short (e.g. 1-2 years) and that the same gamma measurement instruments and scanning systems will be available for use during all of these radiological survey activities. If so, instrument cross-calibration measurements performed for pre-remediation surveys (Section 2.2.4) need not be repeated for verification gamma surveys, provided that the instruments are in current calibration during field use. If not, new cross-calibration measurements will be necessary for post-remediation gamma verification surveys (following the methods detailed in Section 2.2.4) to ensure proper data normalization for comparisons against baseline gamma survey data (Section 7.2.2).

additional area scans are performed, scan coverage may be increased to 50-meter scan transects. Modes of scanning will include ATV and/or backpack based systems (Section 4.2.3). Scan data will be downloaded daily into a project database and plotted on preliminary maps to assess adequacy of scan coverage.

4.2.3 Scanning Protocols, Instrumentation and System Specifications

As indicated in Section 2.2.3, all NaI detectors will be mounted on ATVs (for vehicle scanning) or backpacks (for walkover scanning) at approximately 3 feet above the ground surface during scanning (see Section 7.0 regarding the technical basis for these specifications). Example detector mounting configurations are shown in Figure 5. The specifications for scan data acquisition indicated in Section 2.2.3 are applicable to post-remediation gamma verification surveys and will be observed accordingly. All detectors used for gamma surveys will be properly calibrated within a year prior to use in the field, and daily quality control (QC) measurements will be performed to document proper instrument function, temporal and instrument variability, and to provide quantitative information on data uncertainty (see Section 6.0). As with pre-remediation surveys, base map shape files of specified scan areas (Section 4.2.1) and relevant Site features should be loaded on field computers with GPS-based tracking software to help guide the scanning and ensure coverage across all intended survey areas. Scanning speeds will range between 1 and 5 mph depending on the terrain and mode of scanning.

As previously indicated, Ludlum Model 44-10 NaI detectors will be used for all gamma scanning activities. Each 44-10 detector will be paired with either a Ludlum Model 2350 rate meter, or a Model 2221 scaler/rate meter, equipped with RS232 data output capability. Each detector/rate meter system will be programmed to integrate gamma counts every one second and provide corresponding readings in units of $\mu\text{R/hr}$ or cpm as data output through a RS232 serial port. Each detector/rate meter pairing will have been properly calibrated against a Cs-137 source within one year prior to use for the survey (digital copies of calibration certificates will be kept on file in the project records).



Figure 5: Example detector mounting configurations for backpack and ATV gamma scanning systems.

Each scanning system will utilize a WAAS enabled GPS receiver to provide GPS readings (latitude, longitude) every one second to pair with each individual gamma reading. GPS receivers will be mounted above each detector with a clear view of the sky. Data acquisition will involve appropriate software installed on a portable field computer or on an appropriate alternate type of data logging device. Scan data will be downloaded at the end of each day of survey field work into a project database and plotted on maps to assess adequacy of scan coverage on a daily basis and to help identify any problems that may have occurred with data acquisition.

4.2.4 Soil Sampling

One or more composite samples of surface soils will be collected to a depth of 15 cm in each area specified by the MMD for post-reclamation radiological verification surveys (MMD, 2012). This includes the footprint of the facility, areas around shafts and ore bays, beneath impoundments, the pipeline corridor, and haulage routes within the permit area. At each location, soil sampling and compositing will be conducted in accordance with the protocols indicated in Section 7.2.2 for the supplementary baseline gamma/soil radionuclide correlation study. All soil samples will be analyzed for U-nat, Ra-226, Th-232 and K-40 in accordance with the protocols indicated in Section 7.2.2.

4.2.5 Data Analysis, Presentation and Reporting

Once all individual gamma survey data have been collected, uploaded into the project database, and converted into energy-corrected units of $\mu\text{R/hr}$, they will be plotted in ArcGIS. Appropriate color-coded increments of exposure rate will be applied to allow visual interpretation and spatial analysis. The data will be reviewed for quality control and any clearly identified outliers will be discarded from the scan database. Mapping and kriging will be performed in the same manner described for pre-remediation surveys (Section 2.2.5).

Kriged maps of post-reclamation gamma survey data will be compared against baseline gamma survey data to identify any significant spatial/quantitative differences. Any areas of significant size (e.g. greater than the 20-50 meter spacing for scan transects), and where the average of post-reclamation krig data exceeds the average baseline krig data by more than about $3 \mu\text{R/hr}$, will be considered inconsistent with baseline radiological conditions (i.e. "elevated") and additional remediation may be necessary. Otherwise, the area in question will be considered to be confirmed as consistent with pre-mining radiological baseline conditions. This qualitative and quantitative spatial analysis process will be performed by a qualified environmental health physicist and professional GIS analyst using accepted health physics principles along with standard spatial analysis tools and techniques in ArcGIS.

Raw gamma scan data from both baseline and post-reclamation gamma surveys will be converted into estimates of radionuclide concentrations in surface soils based on the results of the supplemental baseline gamma/soil radionuclide correlation study as detailed in Section 7.2.2 (provided that any such correlations are shown to be statistically significant). In addition, a limited amount of direct soil sampling will be collected in all areas specified by the MMD for post-reclamation radiological verification

surveys (Section 4.2.4) and analyzed at a qualified commercial laboratory. Results will be used for general Site-wide comparisons with direct soil sampling results from the supplemental baseline gamma/soil radionuclide study (Section 7.2.2), with soil sampling results provided in the Radiological Baseline Report (RHR, 2011b), and with any gamma-based estimates of baseline radionuclide concentrations in surface soils generated as a result of the supplemental gamma/soil radionuclide study (Section 7.2.2). All post-reclamation radiological verification survey results, including data, maps, evaluations and conclusions will be provided in a detailed technical report.

5.0 ESTIMATED COSTS

Estimated costs for the pre-remediation gamma survey (Section 2.0), remedial support gamma measurements (Section 3.0), and the post-reclamation verification survey (Section 4.0), are provided in the following tables.

Cost estimate for Pre-Remediation Gamma Survey:

Task / Cost Category	Cost Item	Quantity	Unit ¹	Cost ²	Task Cost
Gamma Surveys & Associated Measurements					
Environmental Health Physicist	Rad Survey Lead ³	6	DY	\$6,000	\$15,855
Field Technician	Rad Tech ³	6	DY	\$4,320	
Gamma Survey Systems (ATVs, detectors, etc.)	Scan equipment ³	6	DY	\$2,790	
Transportation	Truck useage, fuel ³	6	DY	\$585	
Lodging & Per Diem	Lodging & per diem	12	Staff-DY	\$2,040	
Miscellaneous (field supplies, etc.)	Field supplies	6	DY	\$120	
Data Analysis					
Data Analysis to Delineate Contamination	Rad Survey Lead	15	Hr	\$1,875	\$3,375
Mapping	GIS Analyst	15	Hr	\$1,500	

Assumptions

¹DY = 8-hour workday

¹Staff-DY = Combined daily lodging and per diem for field staff for duration of field work

²Based on current (2013) dollar amounts

³Technical resources based out of Albuquerque, NM

Total² = **\$19,230**

Cost estimate for Remedial Support Gamma Measurements:

Task / Cost Category	Cost Item	Quantity	Unit ¹	Cost ²	Task Cost
Gamma Surveys & Associated Measurements					
Environmental Health Physicist	Technical Oversight	4	DY	\$4,000	\$10,835
Field Measurement Personnel ³	Reclamation Worker	30	DY	\$4,800	
Gamma Measurement Instrument ⁴	Instrument Rental	90	DY	\$1,350	
Transportation ⁵	Truck useage, fuel	2	DY	\$345	
Lodging & Per Diem ⁵	Lodging & per diem	2	DY	\$340	

Assumptions

¹DY = 8-hour workday

²Based on current (2013) dollar amounts

³Cleanup takes three months, cleanup worker spends 1/3 of each day taking measurements to help guide excavations

⁴Rental of RadEye PRD or Micro-Rem Meter for duration of cleanup

⁵Travel/lodging expenses for reclamation worker covered under general Reclamation Plan, technical oversight based out of Albuquerque, NM

Total² = **\$10,835**

Cost estimate for Post-Reclamation Radiological Verification Surveys:

Task / Cost Category	Cost Item	Quantity	Unit ¹	Cost ²	Task Cost
<i>Radiological Surveys & Associated Measurements/Sampling</i>					
Environmental Health Physicist	Rad Survey Lead ³	7	DY	\$7,000	\$18,460
Field Technician	Rad Tech ³	7	DY	\$5,040	
Gamma Survey Systems (ATVs, detectors, etc.)	Scan equipment ³	7	DY	\$3,255	
Transportation	Truck useage, fuel ³	7	DY	\$645	
Lodging & Per Diem	Lodging & per diem	14	Staff-DY	\$2,380	
Miscellaneous (field supplies, etc.)	Field supplies	7	DY	\$140	
<i>Outside Services</i>					
Soil Sample Radionuclide Analysis	Laboratory Analysis	15	Samples	\$3,300	\$3,300
<i>Data Analysis and Reporting</i>					
Data Analysis, Verification Reporting	Rad Survey Lead	50	Hr	\$6,250	\$8,250
Mapping	GIS Analyst	20	Hr	\$2,000	

Assumptions¹DY = 8-hour workdayTotal² = **\$30,010**¹Staff-DY = Combined daily lodging and per diem for field staff for duration of field work²Based on current (2013) dollar amounts³Technical resources based out of Albuquerque, NM**6.0 DATA QUALITY ASSURANCE / QUALITY CONTROL**

All gamma surveys, supporting radiological measurements and soil sampling will include a data QA/QC program to provide confidence in the results and ensure that the data generated are reliable, with a minimal amount of uncertainty introduced by variability in instruments and field survey methods. The program is designed to help quantify data uncertainty due to these sources of variability as well as those associated with natural environmental factors (e.g. changes in soil moisture, barometric pressure, etc.). In general, quality assurance (QA) includes qualitative factors that provide confidence in the results, while quality control (QC) includes quantitative evidence that enables estimation of data uncertainty (accuracy and precision).

Data QA protocols/factors include the following:

- Documentation of field activities and any relevant observations regarding environmental or equipment related conditions that could affect survey data.
- Daily review of scan data for general consistency with scan data from other systems and/or adjacent scan tracks.
- The radiological survey designs contained in this plan were developed by qualified environmental health physics professionals with highly specialized experience and expertise in radiological surveys and spatial analysis techniques for uranium recovery site applications.
- Implementation of radiological surveys and data assessments will be conducted by qualified professionals with specialized experience and expertise with these types of surveys based on

education/experience in environmental health physics, preferably with specific experience regarding uranium recovery site applications.

- Technical information regarding the methods used, including supporting references to relevant regulatory guidance, scientific research journal articles or other peer-reviewed technical literature are provided in this document.

Data QC protocols/factors will include the following:

- Technical information on survey instrument calibrations to help quantify accuracy.
- Routine QC measurements will be performed in the field to ensure proper instrument performance and to quantify data precision/reproducibility.

6.1 Quality Control Protocols for Gamma Survey Data

All recorded gamma surveys and interim supporting gamma measurements at the Site will include instrument QC measurements performed at a designated location for each NaI detector that may be used. Preferably this location will be onsite and outdoors, but regardless must always be at the precise same location and positioned in the exact same measurement geometry each day. The purpose is to quantify the consistency of readings between detectors before, during and after the project at a precisely controlled location. Prior to initiation of field work, the mean of 10-20 individual readings of ambient background radiation, as well as radiation from a gamma check-source (e.g. a Cs-137 button source), will be recorded for each detector at the same location and under identical counting geometries. Under these circumstances, all data from any given set of properly calibrated and correctly functioning NaI scanning detectors should approximate a normal (Gaussian) distribution (Figure 6).

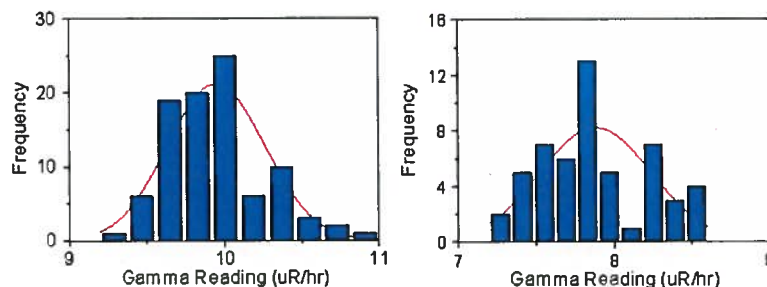


Figure 6: Example frequency histograms for several series of QC measurements from different NaI detector sets used for two separate gamma survey projects. The red lines represent theoretical normal distributions.

This information will be used to construct instrument control charts (see Figure 1, Section 2.1), the limits of which will be periodically updated throughout the duration of the field work as appropriate based on cumulative data from all daily QC measurements. This protocol will help account for natural temporal variability in ambient gamma radiation due to fluctuations in atmospheric or other conditions (e.g. changes

in barometric pressure, soil moisture, radon decay products, etc.). For normally distributed data, over 99% of measurements are expected to fall within ± 3 standard deviations from the mean. Any instrument with a QC measurement result falling outside ± 3 standard deviations from the mean of all previous QC measurements warrants investigation. If a detector exceeds control limits on both background and check-source control charts, it will be replaced with a factory-calibrated spare detector and sent back to the manufacturer for repair and recalibration. An example of an instrument “background” QC chart for NaI detector readings is shown in Figure 1 (Section 2.1).

In addition to daily static QC measurements for any gamma instrument to be used in the field, an additional form of daily data QC protocols will be specifically employed for all recorded gamma surveys (i.e. for both post-mining impact characterization surveys, and post-reclamation gamma verification surveys). The actual operational field performance of each scanning system to be used will be tested onsite each day by obtaining average scan readings along a designated “field strip” (see Figure 2, Section 2.1 for an example of a field strip QC chart). The field strip will be in the range of 20-40 meters in length, and ideally will be located in an area that has relatively uniform gamma readings on all sides. Field strip scans will be conducted before and after each day’s scanning activities in order to evaluate overall system performance and to provide quantitative information regarding the combined amount of data uncertainty attributable to variations in instrument readings (detectors/scanning systems), temporal variations in ambient gamma radiation in the field due to changes in atmospheric or other environmental conditions (e.g. barometric pressure, soil moisture, etc.), and small differences in detector locations and geometry when attempting to replicate measurements along a given scan track. Field strip data for each scanning system must remain within acceptable QC limits throughout the project. In cases where a scan system develops suspect performance during the day’s scanning (e.g. later identified by an unacceptable evening field strip result), the subject data file(s) will be eliminated from the project data base and the system (or detector) in question will be not be used again until repaired or replaced with properly performing spare equipment (also subject to routine field strip QC measurements).

6.2 Data QA/QC for Soil Sampling

A consistent methodology as described in Section 7.2.2 will be followed for all composite soil sampling. At each composite sampling location, the amount of soil collected at each sub-sampling location within the sampling plot will be as equal as possible. Location ID numbers, date, and GPS coordinates for each sampling location will be recorded in the field log book, along with notes of any observations that could potentially affect the data. After samples have been collected, they will be maintained under proper chain-of-custody (COC) protocols. Field sampling personnel will complete a COC form for each shipping container of soil samples to be delivered to the laboratory for analysis. COC/analytical request forms will be provided by the laboratory.

On the COC/analytical request form, the laboratory will be specifically advised as to the crucial importance of thorough homogenization of each soil sample in accordance with the lab’s standard sample preparation protocols. For samples analyzed for Ra-226 by HPGe gamma spectroscopy, aliquots of homogenized samples will be weighed and placed into counting tins, then sealed for a minimum of 21

days prior to counting to allow ingrowth of short-lived Ra-226 progeny and approximate equilibrium conditions to become established. Separate aliquots of the homogenized samples will be used for analyses requiring wet radiochemical methods.

The contract laboratory will have fully qualified radiochemistry capabilities that include appropriate accreditations (e.g. NLAP, EPA, etc.). Each batch of laboratory analyses will include QC measurements (e.g. sample spikes, method blanks, duplicate analyses, etc.) and QC results will be provided with each data report to provide indications of measurement accuracy. The laboratory will use NIST certified standards for instrument calibrations, and for gamma spectroscopy, will utilize NIST or EPA certified soil Ra-226 reference material standards for such calibrations. Laboratory QC data will be reviewed for data quality verification purposes.

The analytical results for Ra-226 concentrations in surface soil samples will be compared against the gamma survey map, as well as a map of estimated Ra-226 concentrations in surface soils across the Site based on gamma/soil radionuclide correlations. Any unusual or dramatic spatial/quantitative discrepancies will be investigated to determine if the subject data can be considered valid results.

7.0 RADIOLOGICAL BASELINE DATA REVIEW AND SUPPLEMENTAL SURVEYS

7.1 Review of Existing Radiological Baseline Data

The radiological baseline data collected by DeNuke in connection with the proposed Roca Honda Mine Site are technically rigorous and spatially comprehensive. While appropriately focused primarily on gamma radiation surveys, certain aspects of the gamma survey methodologies, and how the data are presented in the Baseline Data Report, have practical limitations with respect to direct comparative use for operational purposes (e.g. relative to routine gamma exposure rate measurements for radiation safety evaluations, worker dose assessments, and related Site inspections), and also with respect to the efficiency and timeliness with which data can be collected and analyzed for pre-remediation surveys, remedial support measurements, and post-reclamation verification surveys. It is important to be able to readily evaluate any above-background gamma measurements in terms of doses to humans, and also to maximize the effectiveness, practicality, and efficiency of the gamma survey methodology such that it will be cost-effective over the lifespan of the project. There are also some relatively minor issues related to baseline soil sampling that have been identified in terms of maximizing the future utility of the overall radiological baseline data set. The above considerations are detailed as follows:

1. Based on information provided by DeNuke in the Baseline Data Report (RHR, 2011b), the gamma detectors used to perform baseline gamma surveys were positioned at a detector height of about 10 inches above the ground surface. The Radiological Baseline Report (RHR, 2011b) provides no direct reference to the detector height used for gamma scanning, but shows pictures of DeNuke field personnel scanning with detectors positioned at about 10 inches above the ground surface, and also cites from a table in MARSSIM (NRC, 2000) a value of 2.9 pCi/g as the minimum detectable Ra-226 concentration for the scanning technique used (i.e. the "scan MDC"). This cited value is based on a

detector height of 10 inches above the ground surface. Use of a 10-inch detector height is an unconventional approach for conducting baseline gamma surveys across large areas, yet is appropriate for helping to detect small amounts of contamination that could potentially exist at historic exploratory drilling locations, which was an additional baseline survey objective. A lower detector height has greater sensitivity for detecting small amounts of contamination. However, for general baseline or final verification gamma surveys, a 3-foot detector height is a more standard practice as this height is more representative of whole-body exposure rates, and is also more practical and efficient in terms large-scale field use as it allows sufficient clearance above most vegetation or other types of obstacles when mounted on backpacks or all-terrain vehicles (ATVs). Moreover, the primary data quality objective (DQO) for large-area baseline gamma surveys is to provide characterization of larger-scale spatial distributions across the site, rather than to detect very small and/or subtle anomalies that have little importance in terms of human health risks, or in terms of practical relevance with respect to the likely scope of future remediation needed to achieve consistency with baseline conditions on a site-wide scale.

2. Gamma survey data in the original Radiological Baseline Report were presented in units of counts per minute (cpm) (RHR, 2011b). For comparative assessments with operational and post-remediation gamma surveys, where potential radiological doses to humans are typically of interest, it is appropriate and useful to present baseline gamma survey data in units of exposure rate [micro-roentgens per hour ($\mu\text{R/hr}$)] or dose rate [micro-rem per hour ($\mu\text{rem/hr}$)]. Instrument cross-calibration measurements necessary to convert raw energy-dependent gamma scan data (in units of cpm) into estimates of true exposure rate (in $\mu\text{R/hr}$) were performed by DeNuke field personnel. Although a linear trend in the data provided in the report is apparent, the statistical relationship is not significant (Figure 7). In addition, the scan data presented in the original report were plotted in smaller sub-sections of the Site and legend color scale increments represent a range of values much greater than the range of values actually present. A more useful data presentation will resolve variability in gamma radiation on a more applicable scale, and respectively illustrate both quantitative and spatial distributions simultaneously across the Site on quality aerial imagery to facilitate interpretation of quantitative/spatial relationships relative to planned facilities areas and relevant land features. This is important for identifying contamination, guiding remedial efforts, and demonstrating that post-reclamation gamma survey data are spatially consistent with pre-mining baseline data in corresponding areas.

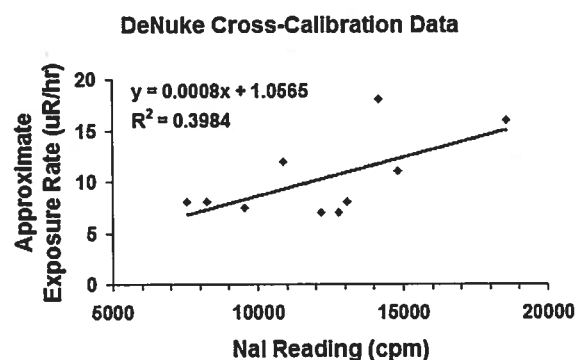


Figure 7: Relationship between energy dependent readings from a Nal-based scanning detector (in cpm) versus approximate gamma exposure rates (in $\mu\text{R/hr}$) based on readings from a less energy dependent micro-rem meter.

3. Characterization of Soil Ra-226 concentrations is a particularly important aspect of radiological baseline studies because it is the immediate long-lived parent of a number of short-lived radionuclides, including radon gas and gamma-emitting decay products which are responsible for a vast majority of the potential for radiation doses to humans. For this reason, Ra-226 is typically a key constituent in terms of remedial objectives. Direct soil sampling is an inherently limited approach for characterizing the spatial distributions of Ra-226 concentrations in surface soils, particularly when the study area is large and spatial variability is relatively high (a fairly common occurrence when geology, soils and land features are variable). A well-established, effective and widely-used analytical approach for spatially comprehensive characterization of Ra-226 concentrations in surface soils involves gamma/soil Ra-226 correlations (NRC, 2003; Johnson et al., 2006; Meyer et al., 2005a and 2005b; Whicker et al., 2006 and 2008). If a gamma/Ra-226 correlation is statistically significant, Ra-226

concentrations in surface soils can be estimated indirectly with reasonable accuracy based on gamma readings across all scanned areas. As part of the 2010 radiological baseline study at the Site, 10 discrete soil samples were collected by DeNuke and analyzed for Ra-226 at a commercial laboratory. At each soil sampling location, discrete gamma measurements were also taken at detector height of 1 meter. Linear regression analysis of the resulting data suggests essentially no statistical relationship ($R^2 = 0.15$) between gamma readings and soil Ra-226 concentrations (Figure 8, top). Part of the reason for this result may be due to the methodology. A discrete measurement and sampling approach is typically less effective versus composite measurements and sampling across larger, more generally representative areas at each correlation assessment location (e.g. across 10×10 meter plots). In addition, note that the statistical linear relationship between gamma readings and U-238 concentrations at these same soil sampling locations is significantly stronger ($R^2 = 0.67$) (Figure 8, bottom). Although U-238 is not a gamma emitter like Ra-226 and its short-lived decay products, both should be expected to display a similar, and reasonably significant, linear relationship with gamma readings as in nature Ra-226 normally exists in a state of approximate radiological equilibrium with its U-238 parent (i.e. respective radioactivity concentrations are approximately equal). The implication of this observation is that there appears to be considerable analytical error associated with Ra-226 results. Potential reasons for such error are discussed in bullet point number 4 below. In order to supplement and further characterize baseline

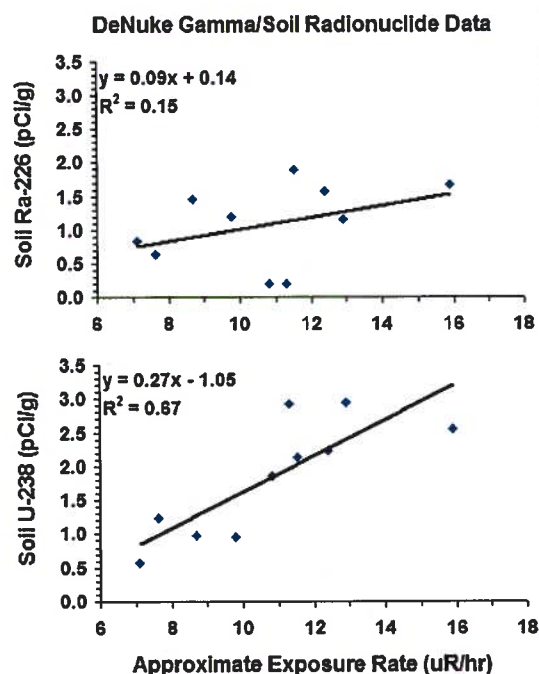


Figure 8: Relationships between approximate gamma exposure rate versus soil Ra-226 concentration (top) and U-238 concentration (bottom) based on data provided in the Radiological Baseline Report (RHR, 2011b).

concentrations of Ra-226 in surface soils across the Roca Honda permit area, additional gamma measurements and soil sampling will be conducted using a methodology specifically designed to establish a more robust gamma/soil Ra-226 correlation that can be used to estimate soil Ra-226 concentrations based on gamma survey data (see Section 7.2.2).

4. EPA Method 907.0, a wet radiochemical separation method, was used by DeNuke for analysis of Ra-226 concentrations in radiological baseline soil samples. Radiochemical separation methods are known to have a tendency to underestimate Ra-226 concentrations relative to direct gamma spectroscopy on an unaltered bulk soil sample using a high-purity germanium (HPGe) detector (EPA Method 901.1, modified for soil samples). Several baseline soil samples collected at the Site were reported by the laboratory to have concentrations of Ra-226 that are exceptionally low for natural soils (e.g. approximately 0.2 pCi/g). In general, there is poor analytical agreement between Ra-226 results and U-238 results at corresponding locations (Figure 8) which as previously mentioned, is a potential indication of analytical uncertainty given the expectation of radiological equilibrium between these radionuclides in natural soils.

Use of the radiochemical separation methodology for Ra-226 analysis has limitations including:

- The sample size is very small (e.g. < 1 gram) raising issues of representativeness,
- There can be self-absorption of alpha emissions from sample precipitate mounting filters,
- It is not possible to dissolve 100% of the radium present in the crystalline soil mineral matrix without the use of expensive and difficult chemical fusion methods or highly aggressive acid digestion techniques, and;
- Radiotracer techniques can introduce analytical errors with respect to estimating the overall chemical yield of Ra-226 resulting from the chemical separation and filter mounting process.

With gamma spectroscopy, these potential sources of data uncertainty are avoided as the radioactivity associated with short-lived decay products of Ra-226 (Pb-214 and Bi-214) from a much larger sample can be measured directly⁹. The use of gamma spectroscopy is appropriate for analysis of Ra-226 in soils, particularly when attempting to correlate gamma survey readings in the field with soil Ra-226 concentrations. Additional soil sampling will be conducted as part of the supplemental gamma/Ra-226 correlation study (as indicated above in bullet point number 3), and these soil samples will be analyzed for Ra-226 using gamma spectroscopy (EPA Method 901.1, modified)¹⁰.

⁹ Once radiological equilibrium between Ra-226 and its short-lived decay products is attained (about 21 days after sealing the soil sample in a counting tin), gamma energy peaks associated with Pb-214 and Bi-214, which are unique and lack major interferences from other radionuclide emissions, can be easily and directly measured and the resulting radioactivity concentration will be equivalent to the parent Ra-226 concentration. Because a large sample is used (e.g. 200 grams), the signal to noise ratio is typically high and data uncertainty is minimized.

¹⁰ These samples will also be analyzed for natural thorium (Th-232) and uranium (U-nat), as well as K-40 (see Section 7.2.2)

5. The 2010 Radiological Baseline Surveys at the Site included analysis of isotopic uranium (U-238, U-235 and U-234). A radiological rationale is not apparent for analysis of isotopic uranium at a uranium mine site. The relative abundances of U-238, U-235, and U-234 contained in uranium as it exists in natural soils and rocks, as well as in uranium ore is essentially constant¹¹. Future soils analysis for uranium at the Site will be performed for natural (total) uranium (U-nat). The analytical method should be EPA Method 200.8 (ICP-MS) or equivalent, preferably with soil matrix digestion using EPA Method 3052 (microwave assisted acid digestion) or equivalent (EPA Method 3050B or equivalent may alternatively be used, recognizing that digestion will not be as complete). With respect to earlier baseline soil analysis results for isotopic uranium, total uranium (U-nat) concentrations will be estimated by summing the isotopic results.

7.2 Supplemental Radiological Baseline Surveys

7.2.1 Reuse Water Pipeline, Access Routes and Utility Corridor

A gamma survey will be conducted along the modified access and utility corridors and the mine water pipeline corridor using gamma scanning equipment specifications and methodologies described in Sections 2.2.3 and 4.2.3 of this document. A backpack or ATV-mounted scanning system will be used while traveling along the corridors in order to accomplish this scanning in an efficient manner. If the ATV-mounted scanning is not appropriate or possible, a backpack-mounted walking or bicycle survey methodology will be used where necessary (e.g. in rough terrain or across areas of limited access). Regardless of the mode of scanning used, the detector will be positioned at approximately 3 feet above the ground surface, with scanning speeds of 1-5 mph depending on the terrain encountered.

Based on initial field review of corridor gamma survey data, 5-10 representative locations will be selected along the corridor for composite sampling of surface soils (to a depth of 15 cm) and analysis for U-nat, Ra-226, Th-232 and K-40 concentrations in accordance with the protocols/methods described in Section 7.2.2 (see Correlation Study) and Section 4.2.4.

7.2.2 Supplemental Onsite Measurements/Sampling

Within the permit area, 10-15 representative locations will be selected for supplementary onsite radiological baseline measurements and soil sampling. Supplemental measurement/sampling locations will be selected based on the range of known gamma survey readings across the Site (see Figure 10, Section 7.3). At each location, the following measurement/sampling will be performed:

¹¹ The total amount of radioactivity contained in natural uranium is partitioned according to the following isotopic percentages: 48.6% is due to U-238, 49.2% is due to U-234, and 2.2% is due to U-235 (cited percentages in health physics literature can vary slightly, but all are close to these values).

Normalization of Gamma Survey Detector Heights:

1. At each location, 10-20 individual readings (cpm) from a properly calibrated Ludlum 44-10/2221 instrument pairing will be recorded at two different detector heights: 10 inches and 3 feet above the exact same point on the ground surface. The average gamma reading (cpm) for each set of individual detector readings for each detector height at each location will be calculated and recorded.
2. Regression analysis will be performed on resulting values to determine the Site-wide statistical relationship between gamma readings at 10 inches versus 3 feet above the ground surface. The resulting statistical relationship, if apparent and statistically significant, will be used to normalize all raw gamma survey data from the original 2010 radiological baseline survey (RHR, 2011b) to approximately equivalent readings at a detector height of 3 feet above the ground surface.

Instrument Cross-Calibration Measurements:

1. At each location, 10-20 individual readings from a properly calibrated Ludlum 44-10/2221 instrument pairing (in units of cpm), along with 10-20 individual readings from a properly calibrated Thermo Scientific Micro-Rem meter (in units of $\mu\text{rem/hr}$) and/or a RadEye PRD (used in energy-compensated dose rate mode with units of $\mu\text{R/hr}$), will be recorded and averaged. Measurement geometry for collection of instrument cross-calibration data will be 3 feet above the ground surface.
2. Regression analyses will be performed on resulting paired values to determine statistical relationships between NaI detectors and Micro Rem and/or RadEye-PRD¹² instruments. The resulting cross-calibration equations will be used to convert 3-foot normalized original scan data (cpm) into energy-corrected units of dose rate ($\mu\text{rem/hr}$) and/or exposure rate ($\mu\text{R/hr}$).

Gamma/Soil Radionuclide Correlation Study:

1. At each location, a 100 m² plot for correlation measurements and soil sampling will be established with pin flags. A gamma scan will be performed across each correlation plot (100% scan coverage at a detector height of 3 feet). The average gamma reading (cpm) from scan data across each correlation plot will be calculated and recorded in the field logbook.
2. Within each correlation plot, 9 sub-samples of surface soils will be collected across the plot (to a depth of 15 cm) and composited into a single sample to represent average soil radionuclide characteristics across the plot. Composite surface soil samples from each correlation plot will be submitted to a qualified commercial laboratory for analysis of Ra-226, U-nat, Th-232 and K-40. The correlation plot scanning/sampling design for each location is illustrated in Figure 9.

¹² Adjustments must be made to all RadEye PRD measurements for cross-calibration purposes (see Footnote 5, Section 2.2.4 and Appendix A).

3. The laboratory chain of custody/analysis request form to be submitted with composite correlation plot soil samples will specify the following requirements:
 - a. Thorough homogenization of each sample at the laboratory.
 - b. Ra-226 analysis by EPA method 901.1 (modified for soil samples) with sample counting to be performed at least 21 days after sealing in the counting tin to ensure full ingrowth of Rn-222 and its decay products. Analysis of K-40 will also be conducted with EPA method 901.1, as will analysis of Ra-228 (to determine Th-232 concentrations under the assumption of radiological equilibrium).
 - c. U-nat analysis by EPA Method 200.8 (ICP-MS) or equivalent, preferably with soil matrix digestion using EPA Method 3052 (microwave assisted acid digestion) or equivalent (EPA Method 3050B may alternatively be used, recognizing that digestion will not be as complete).
4. Upon receiving soil analysis results from the laboratory, regression analysis will be performed to determine if a significant statistical correlation exists between average gamma readings and soil Ra-226, U-nat, Th-232 and K-40 concentrations based on paired data from all correlation plots.

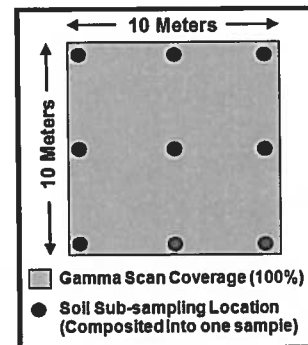


Figure 9: Correlation plot soil sampling and gamma scanning design.

Based on the results of the above supplemental baseline survey elements, modified gamma scan data resulting from 3-foot detector height normalizations and energy dependence corrections will represent additional final results for the baseline gamma survey. In addition, if any of the gamma/radionuclide correlations are statistically significant, existing gamma survey data from the 2010 radiological baseline survey will be converted into estimates of applicable radionuclides in the top 15 cm of the soil profile across the entire Site (after normalization of raw gamma scan data to a 3-foot detector height).

7.3 Updated Radiological Baseline Data Presentations

In order to better understand the quantitative and spatial distributions of ambient gamma radiation across the Site, raw scan data from the 2010 baseline gamma survey (RHR, 2011b) were converted to estimates of approximate exposure rate using the linear equation from Figure 7, and the results were kriged (a geo-statistical interpolation procedure) using Spatial Analyst (an ArcGIS program) (Figure 10). The exposure rates shown in Figure 10 represent only approximate interim estimates for temporary use (e.g. for selecting supplemental radiological measurement/sampling locations) and are subject to change pending normalization of raw gamma scan data to a 3-foot detector measurement height and energy/unit-basis conversions based on supplemental instrument cross-calibration measurements (Section 7.2.2). Once these data adjustments are accomplished, the updated gamma survey data set will be considered finalized and ready for mapping on aerial imagery as shown in Figure 10. Final baseline maps of individual gamma point data as well as gamma krig data will be developed for inclusion

in the supplemental report to be submitted to the MMD as an addendum to Section 13 of the 2011 Baseline Data Report (RHR, 2011b).

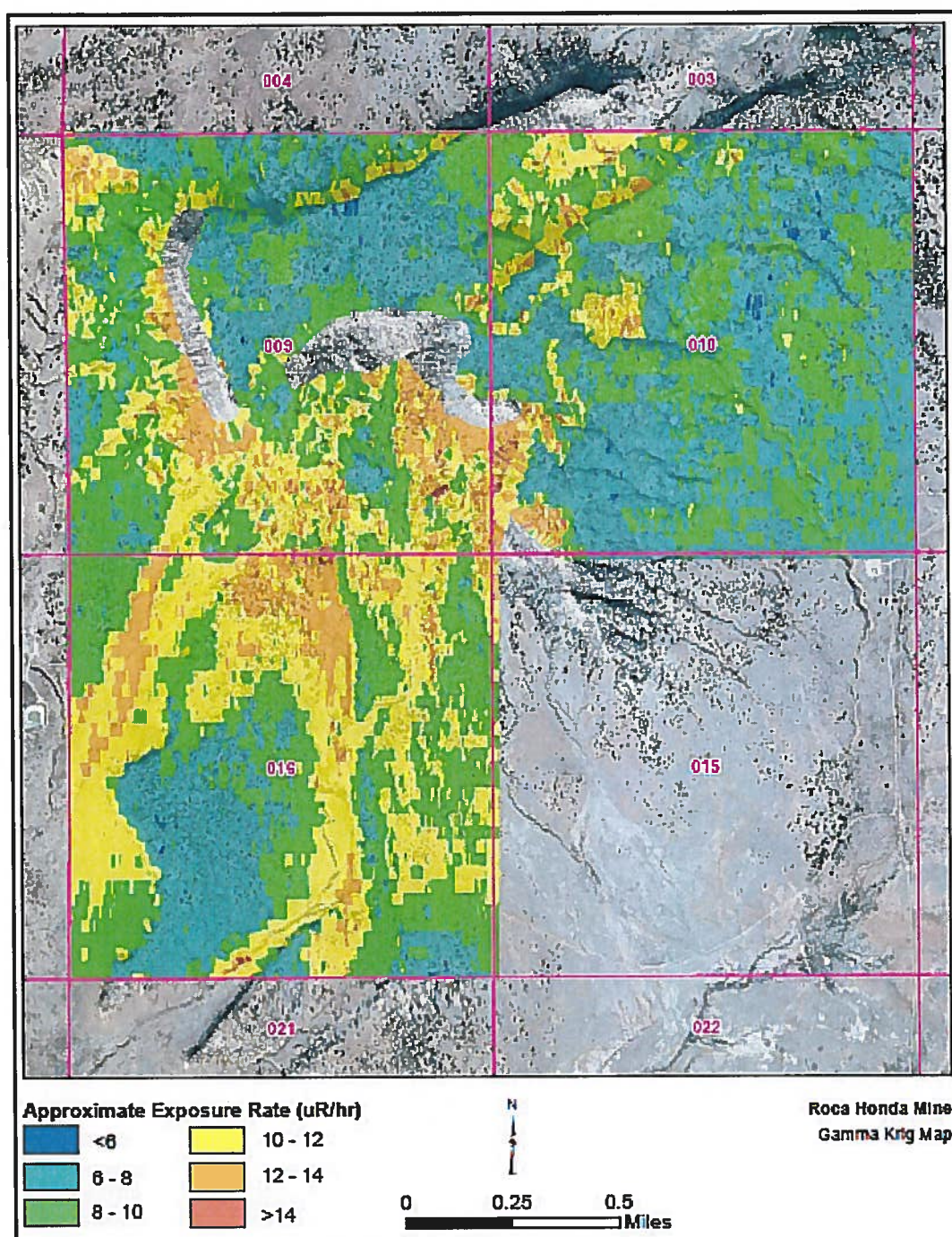


Figure 10: Interim estimates of the spatial distribution of baseline gamma exposure rates across the permit area. A final baseline data set and respective version of this map requires normalization of raw gamma scan data to a 3-foot detector height and energy/unit-basis conversions based on formal instrument cross-calibration measurements (see Section 2.2.2).

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APPENDIX A: RadEye PRD Measurement Adjustments for Instrument Cross-Calibrations

The RadEye PRD instrument is a specialized NaI detector from Thermo Scientific that includes multi-channel energy discrimination for low-energy terrestrial radiation and respective algorithms to provide respective energy compensated response characteristics when used in “dose rate mode”. The manufacturer’s “dose rate” terminology as applied to this NaI detector is based on a commonly used rule-of-thumb that dose rate to tissue is approximately equivalent to exposure rate in air (the detector actually reads out in units of $\mu\text{R/hr}$ which are generally used in reference to the gamma exposure rate in air, though this radiological unit is technically defined in terms of an absorbed dose rate to air). In addition to general low-energy dependence compensation, the RadEye PRD includes an energy discrimination algorithm to ignore the contribution of high-energy photons ($>$ about 1.3 MeV) to the background gamma radiation field in order to measure only the exposure rate attributable to low-energy terrestrial sources of gamma radiation. As a result, two adjustments must be made to all RadEye measurement values that will be used for instrument cross calibration purposes.

When the RadEye PRD instrument is first turned on in dose rate mode, it will go through a “learning” procedure that takes about 20-30 seconds to complete. During this start-up procedure, the instrument will calculate the exposure rate attributable to interactions in the NaI crystal from ambient background photons with energies greater than about 1.3 mega-electron volts (MeV). This high-energy component of the background radiation field is ignored for all subsequent measurements while low-energy dependence compensation algorithms are applied to the remaining gamma energy spectra to measure the “true” exposure rate associated only with lower-energy photons from terrestrial sources. Essentially, this procedure “strips out” instrument response due to high-energy cosmic sources of background radiation, as well as that due to high-energy terrestrial radiation from K-40 (which emits a 1.46 MeV photon). To correct for this background “stripping” of the portion of the total gamma field attributable to cosmic and K-40 photons, the following calculations and adjustments must be made when RadEye measurement data are to be used for instrument cross-calibration purposes:

ADJUSTMENT FOR COSMIC RADIATION:

1. Elevations at Site range from about 7,135 to 7,800 feet. The estimated approximate average elevation of the site is about 7,400 feet (2,255 meters).
2. Based on the average elevation (2,255 meters) as estimated above, the approximate average exposure rate from cosmic sources at the Site is calculated to be 6.9 $\mu\text{R/hr}$, using the following relationship as provided in Stone et al. (1999):

$$D_c = (7 \times 10^{-6} (E)^2 - 1.2 \times 10^{-3} (E) + 27.38) 0.114$$

Where:

D_c = Cosmic component of total exposure rate ($\mu\text{R/hr}$)

E = Average elevation in meters (from Step 1 above)

0.114 = Unit conversion factor from nGy/hr to $\mu\text{R/hr}$

3. For each average RadEye PRD reading obtained at each cross-calibration measurement location, add 6.9 $\mu\text{R/hr}$ as calculated in Step 2 above to account for the cosmic component of the total exposure rate (note: the cosmic component of exposure rates at the Site will vary only slightly due to differences in elevation, e.g. ranging from about 6.6 to 7.3 $\mu\text{R/hr}$).

ADJUSTMENT FOR TERRESTRIAL GAMMA RADIATION FROM K-40:

1. For each cross-calibration measurement location at the site, determine the corresponding local concentration of K-40 in surface soil based on the composite surface soil sample collected across the corresponding gamma/soil radionuclide correlation plot (in pCi/g) (see Section 2.5).
2. Multiply the result in Step 1 above by 0.184 ($\mu\text{R/hr}$)/(pCi/g) (a conversion factor for an infinite plane as indicated in NCRP, 1987) to determine approximate average exposure rate due to K-40 in surface soil at each cross-calibration measurement location.
3. For each average RadEye PRD reading obtained at each cross-calibration measurement location, add the corresponding terrestrial exposure rate value for K-40 as calculated in Step 2 above.

Once the contributions of cosmic sources and terrestrial K-40 sources to the total “true” exposure rate at each cross-calibration location have been added to the average RadEye PRD reading at each location, perform a linear regression of average NaI detector reading (x axis) versus average “adjusted” RadEye PRD reading (y axis). The resulting linear regression equation will be used to convert all raw NaI-based gamma survey data into estimates of “true” exposure rate.

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Appendix G Preliminary Reclamation Cost Estimate

NOTE: The preliminary estimate is complete for the level of project design and scope presently available, while expressly recognizing that it will be updated as detailed engineering, agency requirements, monitoring requirements, mitigation measures, and final reclamation obligations are established.

ROCA HONDA RESOURCES, LLC
ROCA HONDA UNDERGROUND URANIUM MINE PROJECT
APPENDIX G - PRELIMINARY RECLAMATION COST SUMMARY

Section 9

Date: September 2, 2025

Item	Updated Cost
Mob/Demob	\$7,500
Well/Drill Hole Pads & Mud Pits	\$35,000
Well/Drill Hole Access Roads	\$2,418
Dewatering Wells decommissioned and plugged (1)	\$15,000
Dewatering Wells pipelines	\$5,000
Vent Closures	\$60,000
Haul Roads (+culverts)	\$25,000
Arroyo Diversions & Armorment	\$10,000
Access Roads	\$25,000
Revegetation	\$20,000
Fence Revegetated Area	\$10,000
<u>TOTAL</u>	\$214,918

ROCA HONDA RESOURCES, LLC
ROCA HONDA UNDERGROUND URANIUM MINE PROJECT
APPENDIX G - PRELIMINARY RECLAMATION COST SUMMARY

Section 10

Date: September 2, 2025

Item	Updated Cost
Mob/Demob	\$15,000
Well/Drill Hole Pads & Mud Pits	\$25,296
Well/Drill Hole Access Roads	\$2,418
Dewatering Wells decommissioned and plugged (7)	\$95,500
Dewatering Wells pipelines	\$18,000
Vent Closures	\$89,137
Haul Roads (+culverts)	\$100,000
Arroyo Diversions & Armorment	\$25,000
Access Roads	\$54,312
Revegetation	\$45,000
Fence Revegetated Area	\$22,500
<u>TOTAL</u>	\$492,163

ROCA HONDA RESOURCES, LLC
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APPENDIX G - PRELIMINARY RECLAMATION COST SUMMARY

Section 16

Date: September 2, 2025

Project Area / Facility	Cost
Mobilization / Demobilization	\$30,021.65
Well/Drill Hole Pads & Mud Pits (11)	\$157,469.05
Well/Drill Hole Access Roads	\$20,180.14
Section 16 non-ore material stockpile area	\$101,212.14
Section 16 Shaft Excavation Material stockpile	\$840,731.00
Removal of equipment from underground	\$0.00
Ore Pad/Bays	\$36,165.23
Explosives Magazine	\$9,944.94
Dewatering Wells decommissioned and plugged (5)	\$299,609.97
Dewatering wells pipelines	\$67,257.97
Headframe & Facility Demolition	\$72,097.60
Shaft/Vent Closure	\$70,118.81
Truck Wash/Wash Pad	\$0.00
Admin - Office / Dry	\$0.00
Hoist House	\$81,115.11
Scale/Assay House	\$0.00
Employee Parking Lot	\$27,242.18
Fencing Removal	\$102,313.65
Electric Substation	\$61,177.64
Emergency Generator	\$10,985.91
Maintenance Shop	\$0.00
Storage and Laydown Yard	\$14,009.66
Haul Roads (+ culverts)	\$215,479.70
Wastewater Treatment Plant	\$0.00
Water Tank	\$13,201.69
Fuel Depot	\$30,521.29
Evaporation ponds	\$0.00
Evap Ponds sludge disposal	\$0.00
Detention Ponds	\$122,682.03
Arroyo Diversions & Armorment	\$51,148.74
Subbase rock stockpile	\$182,681.09
East Subsoil stockpile	\$30,383.88
Topdressing stockpiles	\$285,189.21
Water Treatment Facility	\$15,000.00
Access Roads	\$36,285.07
Revegetation	\$217,005.90
Fence Revegetated Area	\$60,427.07
TOTAL:	\$3,261,658.29

Note:

Costs developed for bringing all equipment up through Section 17 Shaft / none for Section 16 Shaft

ROCA HONDA RESOURCES, LLC
ROCA HONDA UNDERGROUND URANIUM MINE PROJECT
APPENDIX G - PRELIMINARY RECLAMATION COST SUMMARY

Section 17

Date: September 2, 2025

Project Area / Facility	Cost
Mobilization / Demobilization	\$30,021.65
Well/Drill Hole Pads & Mud Pits (11)	\$157,469.05
Well/Drill Hole Access Roads	\$22,333.81
Section 17 non-ore material stockpile area	\$101,212.14
Section 17 Shaft Excavation Material stockpile	\$402,161.97
Removal of equipment from underground	\$288,866.14
Ore Pad/Bays	\$45,958.75
Explosives Magazine	\$9,944.94
Dewatering Wells decommissioned and plugged (5)	\$136,392.82
Dewatering wells pipelines	\$36,168.61
Headframe & Facility Demolition	\$72,097.60
Shaft/Vent Closure	\$70,118.81
Truck Wash/Wash Pad	\$37,020.83
Admin - Office / Dry	\$116,682.43
Hoist House	\$81,115.11
Scale/Assay House	\$48,180.04
Employee Parking Lot	\$27,242.18
Fencing Removal	\$102,313.65
Electric Substation	\$61,177.64
Emergency Generator	\$10,985.91
Maintenance Shop	\$164,140.74
Storage and Laydown Yard	\$12,434.66
Haul Roads (+ culverts)	\$318,536.98
Wastewater Treatment Plant	\$32,236.78
Water Tank	\$13,201.69
Fuel Depot	\$30,521.29
Evaporation ponds	\$94,567.38
Evap Ponds sludge disposal	\$36,380.05
Detention Ponds	\$94,488.58
Arroyo Diversions & Armorment	\$108,672.06
Subbase rock stockpile	\$94,628.19
East Subsoil stockpile	\$30,383.88
Topdressing stockpiles	\$388,171.68
Water Treatment Facility	\$305,758.91
Access Roads	\$36,285.07
Revegetation	\$379,223.39
Fence Revegetated Area	\$88,901.36
TOTAL:	\$4,085,996.75

Note:

Costs developed for bringing all equipment up through Section 17 Shaft / none for Section 16 Shaft

Appendix H Proposed Reference Area at the Roca Honda Project Site

Proposed Reference Area at the Roca Honda Project Site

Introduction

As presented in Section 4, Appendix 4-C of the BDR (RHR, 2020), transect lines were surveyed for canopy cover throughout the proposed project site. These lines were located to support the preparation of a vegetation map. The lines were placed in the various vegetation types encountered within the project area.

Eighty one (81) transects were surveyed throughout the permit area to characterize the vegetation types (see Figure 3 in Appendix 4-C). Five vegetation types were identified in the permit area (see Figure 5 in Appendix 4-C). Three vegetation types dominate Section 16, juniper savanna, shrub-grassland, and pinon juniper woodland. The juniper savanna and shrub-grassland vegetation types were similar with respect to total cover characteristics: (i) total vegetation cover (grass, forb, shrub and microbiotic cover; tree canopy excluded), (ii) the sum of bare ground, gravel and rock cover, and (iii) litter cover. The pinon juniper woodland areas have steeper slopes and valleys which are not conducive for grazing. Revegetation efforts will focus on restoring a generalized matrix of native grasses, forbs and shrubs on the landscape rather than specifically attempting to recreate both the juniper savanna and shrub-grassland now present. Therefore, combining these two vegetation types is appropriate since species composition and vegetative structure were similar.

A total of 35 of the 81 transects in these two vegetation types were distributed across Sections 9, 10, 11 and 16. Fifteen (15) transect lines are in areas where no mining disturbance is planned. The remaining 20 transect lines will most likely be disturbed by mining activity. Eight (8) of the 15 lines that are anticipated to remain undisturbed by future mining activity are located in Section 16. A revegetation reference area, which includes the 8 transect lines that will be undisturbed by mining activity is proposed in Section 16 (see Figure 3-3 in this Reclamation Plan, Revision 2).

Methodology

As discussed in the BDR, data collection for vegetation cover estimates was conducted in June, July and September 2008. Vegetation cover was measured using the point intercept method along a 50 m (164 ft) long transect line. The cover that intercepted the line at 1m intervals along the 50 m (164 ft) transect line was measured using an optical device. Using this method, the different classes of cover were calculated as the percentage of interceptions (“hits”), relative to the total number of points sampled. During the survey, bare ground was defined as soil alone. Gravel and coarse sand were combined and classified as particles up to 7.6 cm (3 inches). Rocks are particles greater than 7.6 cm (3 inches). Litter was dead plant material directly covering the ground, dead perennial vegetative bases, or animal scat, including cow dung. If a small stem or piece of litter was not considered large enough to intercept a raindrop, the “hit” was the ground covering, or lack of covering, below it. Dead annual forbs were considered as litter cover when unattached to the roots and potentially windblown. A dead annual forb that was attached to its root and recognizable to species was recorded as that species.

Species were recorded when the sampling point fell on any part of the vegetation. When the canopy of multiple species overlapped, canopy overhung bare ground, litter, or gravel/coarse sand, all the

cover-types were recorded. However, to estimate cover, only the uppermost layer was analyzed so that total cover added up to 100%. Basal cover was not measured.

Transect line percent-cover results were reported as the average (arithmetic mean). The variance and standard deviation of the mean was computed using a computer statistics package Statgraphics® Plus. Median values for each class of cover were also calculated. The Statgraphics® Plus software statistics package was also used to measure standard kurtosis, skewness and confidence intervals to make sure the samples came from a normal population before comparing the values using the T-test.

Analysis of ground cover data that supports the use of a reference site in Section 16

Total vegetation canopy and microbotic cover, total bare ground plus gravel plus rock, and litter cover were compared between the transect lines in areas anticipated to be disturbed by mining and those areas that are not.

Table 1 describes the summary statistics for the two samples of total vegetation cover, inorganic ground cover and litter cover. Standardized skewness and standardized kurtosis can be used to determine whether the samples come from normal distributions. Values of these statistics outside the range of -2 to +2 indicate significant departures from normality, which would tend to invalidate the statistical tests that compare the standard deviations. In this case, both standardized skewness values and both standardized kurtosis values for all samples are within the range expected if the samples came from a normal distribution. Therefore, confidence levels can be constructed for each sample mean and the T-test can be used to compare sample means between the cover values.

Confidence intervals were constructed for each mean and the difference between the means (see Table 2 below). A T-test was also run to determine the likelihood that the means of both samples were not statistically different from each other. No differences between the standard deviations of the two samples were detected so that all tests can assume equal variances.

The confidence interval for the difference between the means of total vegetation cover extends from -13.7 to 11.5. Since the interval contains the value 0.0, there is not a statistically significant difference between the means of the two samples at the 95.0% confidence level. The T-tests also support this conclusion; $t = -0.18$ and $P\text{-value} = 0.86$. P values below 0.05 would have indicated significant differences between the two means. An F-test was used to compare the variances of the two samples and indicated that there is not a statistically significant difference between the standard deviations of the two samples at the 95.0% confidence level. Median values for each population were also compared using the Mann-Whitney (Wilcoxon) W test. This test is constructed by combining the two samples, sorting the data from smallest to largest, and comparing the average ranks of the two samples in the combined data. There is not a statistically significant difference between the medians at the 95.0% confidence level.

Table 1: Summary Statistics for total vegetation (vascular plant canopy and microbotic) cover, total inorganic (bare ground, gravels and rock) cover and litter.

Value	Areas not to be disturbed	Areas within or near the disturbance zones
Number of transect lines	8	20
Average - total vegetation cover	43.5	44.6
Variance - total vegetation cover	280.9	188.7
Standard deviation - total vegetation cover	16.8	13.7
Minimum - total vegetation cover	16.0	22.0
Maximum - total vegetation cover	62.0	74.0
Std. Skewness - total vegetation cover	-0.74	0.89
Std. Kurtosis - total vegetation cover	-0.51	-0.28
Median - total vegetation cover	47	43
Average - total inorganic cover	27.3	24.7
Variance - total inorganic cover	98.2	118.4
Standard deviation - total inorganic cover	9.9	10.9
Minimum - total inorganic cover	8.0	2.0
Maximum - total inorganic cover	38.0	46.0
Std. Skewness - total inorganic cover	-1.109	-0.228
Std. Kurtosis - total inorganic cover	0.605	-0.101
Median - total inorganic cover	28	25
Average - litter cover	29.3	30.7
Variance - litter cover	146.2	107.484
Standard deviation - litter cover	12.1	10.4
Minimum - litter cover	18.0	8.0
Maximum- litter cover	52.0	46.0
Std. Skewness - litter cover	1.114	-0.535
Std. Kurtosis- litter cover	0.076	-0.514
Median - litter cover	25.0	32

Mining Act Reclamation Bureau 1996. CLOSEOUT PLAN GUIDELINES FOR EXISTING MINES. April 30, 1996. Mining and Minerals Division, New Mexico Energy, Minerals and Natural Resources Department, 2040 S. Pacheco St., Santa Fe, New Mexico Available online at: http://www.emnrd.state.nm.us/MMD/MARP/Documents/MARP_Closeout_Plan_Guidelines_Main_Text.pdf

Table 2: Confidence intervals for each mean and the difference between the means.

Value	95.0% confidence interval
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mean of total vegetation cover along undisturbed Transects	43.5 +/- 14.0
mean of total vegetation cover along potentially disturbed transects	44.6 +/- 6.4
difference between the means of total vegetation cover assuming equal variances	-1.1 +/- 12.6
mean of inorganic cover along potentially undisturbed lines	27.3 +/- 8.3
mean of inorganic cover along potentially disturbed lines	24.7 +/- 5.1
difference between the means of inorganic cover samples with equal variances	2.6 +/- 9.1
mean of litter cover along potentially undisturbed lines	29.3 +/- 10.1
mean of litter cover along potentially disturbed lines	30.7 +/- 4.9
difference between the means of litter cover samples with equal variances	-1.5 +/- 9.3

The confidence interval for the difference between the means of inorganic cover (bare ground, gravels and rock) extends from -6.6 to 11.7 (Table 2). Since the interval contains the value 0.0, there is not a statistically significant difference between the means of the two samples at the 95.0% confidence level. The T-tests ($t = 0.57$; $P\text{-value} = 0.57$) also arrived at the same conclusion. P-values below 0.05 indicate significant differences between the two means. An F-test was used to compare the variances of the two samples and indicated that there is not a statistically significant difference between the standard deviations of the two samples at the 95.0% confidence level. Median values for each population were also compared using the Mann-Whitney (Wilcoxon) W test. There was no statistically significant between the median values of the two samples (Table 1) at the 95.0% confidence level.

The confidence interval for the difference between the means of litter cover extends from -10.79 to 7.89. Since the interval contains the value 0.0, there is not a statistically significant difference between the means of the two samples at the 95.0% confidence level. The T-tests also arrived at the same conclusion; $t = -0.32$, $P\text{-value} = 0.75$. P-values below 0.05 indicate significant differences between the two means. An F-test to compare the variances of the two samples was run and the results were consistent with the confidence intervals constructed for each standard deviation and for the ratio of the variances, which indicated that there is not a statistically significant difference between the standard deviations of the two samples at the 95.0% confidence level. Median values for each population were also compared using the Mann-Whitney (Wilcoxon) W test. There was no statistically significant difference between the median values of the two samples (Table 1) at the 95.0% confidence level.

Adequate sampling entails making sufficient measurements of a given parameter in order to obtain a mean value that is within 10 percent of the populations' true mean value with a 90 percent statistical confidence level.

$$nmin = \frac{T^2 S^2}{(dx)^2} \quad (\text{Equation 1})$$

Where:

nmin = the minimum number of sample points needed in a given vegetation type

S= the sample deviation

t = the two-tailed t statistic at the appropriate number of degrees of freedom

d = the acceptable amount of inherent variability to be identified between the sample mean and the true population mean = 0.1

x = the sample mean.

Using Equation 1 and the results from all (35) transect lines within the project site, the minimum number (*nmin*) of transect lines required to obtain a mean value that is within 10 percent of the populations' true mean value with a 90 percent statistical confidence level for total vegetation cover is 27, for litter *nmin* is 36, and for total inorganic cover (bare ground, gravel and rock) *nmin* is 48. The higher numbers required for litter and inorganic ground cover reflect the higher variability and the fact that some values fell outside the 30 to 70% threshold that is cited to indicate that data transformation is necessary (Hofmann and Ries 1990, Li 1964, Steel and Torrie 1980, Snedecor 1956). When the data was transformed by taking the square root of the value plus one, *nmin* was recalculated to be 14 for inorganic cover and 10 for litter cover.

Conclusion

An area of 137 acres containing 8 transects in Section 16 has been identified as a reference area to be utilized to determine revegetation/reclamation success. Although this area contains some pinon-juniper, re-planting of trees will not be done due to the low probability of success. In addition, the invasion of junipers, particularly in the absence of fire can lead to reduced rangeland quality. Therefore, portions of the reference area transects will not be sampled during the reclamation performance surveys, i.e., the mature pinion juniper woodland, the rock barrens, gullies and breached stock pond dikes. The seed mix provided in Table 3-3 of the Plan includes a diversity of native grasses and shrubs that can be easily established to prevent erosion, meet groundcover diversity and density objectives in Section 3.7 of the Plan, and provide forage for livestock and value for wildlife as recommended in the habitat guidelines published by the NMDGF (2004).

Appendix I Weed Control Plan

Noxious Weed Control Plan for the Roca Honda Mine Project Area

Introduction and Current Condition

Certain invasive, non-native plant species are classed as “noxious weeds” by the State of New Mexico. Only species classified as such will be managed at the project site. The New Mexico State Noxious Weed List was revised in April 2009. Because of the dynamic nature of biological systems, the plant species recognized as noxious and management guidelines for noxious weeds may change in the future (Wanstall 2008). For example, field bindweed (*Convolvulus arvensis*) observed at the project site in 2008 was listed as a Class C weed in 1999, but not in 2009. In contrast, cheatgrass (*Bromus tectorum*), which was also observed at the project site in 2008, was not listed in 1999, but was listed as a Class C weed in 2009 (Dubois 1999, Gonzalez 2009).

Ongoing, continual observations for noxious weeds will be carried out by site personnel and known identified noxious weed species will be treated during the appropriate season to minimize the potential of spread. In addition, on a Bi-Annual basis, a more structured pedestrian survey for noxious weeds will be carried out at the project site so that any infestations can be identified and controlled in a timely manner.

The only noxious weeds observed in 2008 were saltcedar (*Tamarix* species) and cheatgrass (*Bromus tectorum*). These non-native species are both considered to be a Class C noxious weed by the state of New Mexico (Gonzalez 2009). Class C weeds are “species that are widespread in the state. Management decisions for these species should be determined at the local level based on feasibility to control and level of infestation” (Gonzalez 2009). Saltcedar trees are a persistent, high moisture obligate species, and were observed in the central area of Section 16 at the stock pond and infrequently along the arroyo that leads from this area to San Mateo Creek. This species can be difficult to control if left unmanaged.

Cheatgrass is an annual grass that can invade and dominate grassland areas if unmanaged. It is not only a poor forage species for livestock and wildlife, once it passes the green phase, it becomes dry and brittle and can pose a significant wildfire threat if established in high numbers. Currently it appears to exist in sparse occurrence, with less than five (5) cheatgrass plants were observed in the area beside a rock water pocket in a canyon Section 10.

In 2006, two additional species of noxious weeds were observed: Canada thistle (*Cirsium arvense*) and musk thistle (*Carduus nutans*). Both species were observed in drainage areas in Section 16.

Canada thistle is considered a Class A noxious weed while Musk thistle is considered a Class B noxious weed by the state of New Mexico (Gonzalez 2009). Class A weeds are “species that currently are not present in New Mexico or have limited distribution; preventing new infestations of these species and eradicating existing infestations is the highest priority” and Class B weeds are “species that are limited to portions of the state. In areas that are not infested, these species should be treated as Class A weeds. In areas with severe infestations, management plans should be designed to contain the infestation and stop any further spread” (Gonzalez 2009).

Noxious Weed Control

Noxious weed control measures will be implemented in a manner consistent with applicable federal and State of New Mexico regulations and in coordination with the U.S. Forest Service, Cibola National Forest. Control methods will be selected based on species, infestation extent, proximity to sensitive resources, and effectiveness, and will emphasize early detection and rapid response for new infestations.

There are a few potential control methods for species currently identified on the site:

a. Since salt cedar trees were few at the site, they could easily be eliminated. One effective way to control salt cedar in this situation is to employ a procedure known as the cut-stump herbicide or cut-stump/frill herbicide methods (e.g. Neill 1990, Hughes 1996). This procedure involves physically cutting the above ground stems as close to the ground surface as possible and then immediately painting the cut stems with an appropriate herbicide (e. g., Triclopyr (Garlon 4 or Remedy).

b. Cheat grass is not common at the site. In 2008 the only places where it was found was adjacent to the water pocket in Section 10. If population density remains at current levels, hand-pulling cheatgrass before it sets seed at the pool sites could be accomplished on an annual basis for the duration of the project. Should plant number increase enough to make this impracticable, herbicides such as Roundup (glyphosate), Journey (imazapic plus glyphosate), or Plateau (imazapic) provide management options for cheatgrass infestations. Application when in proximity to open water or ephemeral watercourses would be with wick or other physical application method and not spray application. This would likely control the growth at the water pocket and stop the species progressing down the arroyos.

c. The thistles can be managed with herbicide application. No details were given as to the size of the infestations in 2006 except that they were relatively small. Therefore, possible herbicide application might be Stinger (clopyralid), for example at ~2 teaspoons/gal/1000 square foot or Confront (triclopyr + clopyralid) for example at ~4.5 teaspoons/gal/1000 square foot. Both herbicides should be applied in the spring, or possibly in the fall, when the plants are at the rosette stage.

Pesticide Use and Applicator Requirements

Where herbicide application is determined to be necessary, all pesticide use will comply with label requirements, federal regulations, and State of New Mexico pesticide laws. All herbicide applications will be conducted by personnel holding a valid New Mexico Pesticide Applicator License appropriate to the application type.

Application records will be maintained and made available to the U.S. Forest Service upon request. Records will include, at a minimum: application date, location, target species, herbicide used, application method, weather conditions, and applicator identification.

USFS Coordination

For treatments occurring on National Forest System lands, the operator will coordinate with the U.S. Forest Service, Cibola National Forest, prior to implementation. Coordination will include review and concurrence on treatment methods, herbicide selection, application timing, and any required mitigation measures.

No treatment activities will occur on National Forest System lands without prior notification and approval, as applicable.

Monitoring and Personnel Training

Ongoing observations for noxious weeds will be conducted by trained site personnel throughout the life of the project. All personnel involved in ground-disturbing activities, reclamation, environmental compliance, or vegetation management will receive training in the identification of invasive and noxious plant species known to occur within the project area and surrounding region.

Training will include, at a minimum:

- (1) identification of species listed on the current New Mexico Noxious Weed List,
- (2) recognition of early-stage infestations, particularly for Class A and B species, and
- (3) procedures for documentation and reporting of new infestations.

Training will be completed prior to the initiation of project activities and refreshed annually or as needed.

In addition to routine observations, formal pedestrian surveys will be conducted bi-annually in areas of disturbance, including but not limited to roads, pads, stockpiles, drainage features, water management structures, and reclaimed areas.

Revegetation Seed Mix and Application

All disturbed areas will be revegetated using an approved seed mix designed to promote the establishment of native or desirable species consistent with site conditions and surrounding vegetation communities.

The seed mix will consist of certified weed-free seed, ensuring that no additional invasive or noxious species are introduced during reclamation activities. Seed certification documentation will be maintained and made available to the U.S. Forest Service upon request.

Prior to seed application, the operator will coordinate with the Cibola National Forest to review and obtain concurrence on the proposed seed mix composition, application methods, and timing. This coordination will ensure consistency with Forest-specific revegetation requirements, ecological site conditions, and long-term land management objectives.

Seed application will be conducted using appropriate methods (e.g., drill seeding, broadcast seeding) based on site conditions and will be timed to optimize germination and establishment success. Revegetated areas will be monitored as part of the overall reclamation and invasive species monitoring program to evaluate success and determine if reseeding or adaptive management measures are necessary.

References

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