



NEVADA DIVISION OF
**ENVIRONMENTAL
PROTECTION**

A division of the
Nevada Department of Conservation & Natural Resources

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**Reasonable Potential Analysis
National Pollutant Discharge Elimination System Permit
NV0024267**

**South Railroad Mine
Carlin, Elko County, Nevada**

Gold Standard Ventures (US), Inc. (GSV) has applied for coverage under a new National Pollutant Discharge Elimination System (NPDES) permit (NV0024267) for the South Railroad Mine project located approximately 20 miles southeast of Carlin, within Elko County, Nevada. GSV is proposing to discharge treated intercepted groundwater from the South Railroad Mine to an unnamed tributary to Dixie Creek.

As part of developing a new NPDES permit, NDEP performed an antidegradation review pursuant to Nevada Administrative Code (NAC) 445A.3045 and 445A.3046. During the antidegradation review, interim baseline values (IBVs) were developed using samples obtained from the unnamed tributary to Dixie Creek. These IBVs were then used in a Reasonable Potential Analysis (RPA) to determine what pollutants will cause, have the reasonable potential to cause, or contribute to an exceedance above the IBVs. The outcome of the RPA indicated that the discharge has the reasonable potential to cause, or contribute to, an in-stream exceedance above the developed IBVs for antimony, arsenic, barium, iron, manganese, thallium, fluoride, and sulfate.

As per NAC 445A.3047, if the antidegradation review conducted by the Division determines that the discharge for which an application is submitted will degrade the IBV for a parameter of concern in the receiving water that has been designated as having a Tier 2 level of antidegradation protection, the Division shall require the applicant to submit for the review by the State Environmental Commission an analysis of alternatives. GSV submitted the analysis of alternatives on August 18, 2026.

For transparency purposes, NDEP is providing the attached white papers titled, *“Reasonable Potential Analysis – South Railroad Mine”*, and *“Development of Interim Baseline Water Quality Values for Antidegradation Review – South Railroad Mine”*, which present a broad overview of NDEP’s approach to performing an RPA for the purpose of determining the need for numerical water quality-based effluent limitations and to establish IBVs. These documents are designed to provide insight to interested parties by addressing the approach and outcome for South Railroad’s proposed NPDES permit.

Reasonable Potential Analysis Results – South Railroad Mine

Introduction

Gold Standard Ventures (US), Inc. (GSV) has applied for coverage under a new National Pollutant Discharge Elimination System (NPDES) permit (NV0024267) for discharges of treated intercepted groundwater from the proposed South Railroad Mine to an unnamed tributary of Dixie Creek. When developing any NPDES permit, the Nevada Division of Environmental Protection (NDEP) is required to perform a reasonable potential analysis, or RPA, to determine if numerical water quality-based effluent limitations (WQBELs) are necessary.

Pursuant to the Clean Water Act (CWA) and Nevada’s Water Pollution Control Law at Chapter 445A of the Nevada Revised Statutes (NRS), discharge permits must include WQBELs. Title 40 of the Code of Federal Regulations (CFR) section 122.44(d)(1)(i) requires permits to include limitations for pollutants that are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including narrative criteria. The process of determining what pollutants will cause, have the reasonable potential to cause, or contribute to an excursion above a water quality standard is through an RPA.

In performing the RPA, NDEP stayed in accordance with the CWA, Nevada’s Water Pollution Control Law, and Nevada’s Reasonable Potential Analysis (RPA) Procedures.

Identifying the Applicable Water Quality Standards

As stated in the *Introduction* section of this document, GSV proposes to discharge treated, intercepted groundwater to an unnamed tributary of Dixie Creek. There are no adopted water quality criteria for the receiving water; however, it is a tributary to the South Fork of the Humboldt River. Using the “tributary rule”, found at Nevada Administrative Code (NAC) 445A.1239, water quality criteria at the nearest downstream control point, “Humboldt River, South Fork at the Humboldt River” (NAC 445A.1466) apply. However, as water quality criteria at NAC 445A.1466 do not contain any requirement to maintain existing high water quality (RMHQ) (NAC 445A.3038), NDEP was required to calculate interim baseline values (IBVs) for each parameter of concern expected to be present in the proposed discharge (see white paper titled *Development of Interim Baseline Water Quality Values for Antidegradation Review – South Railroad Mine* for information on how the IBVs were developed). Results of the developed IBVs can be found in Attachment A. The developed IBVs were used, in lieu of the RMHQ, in the RPA process to determine whether numeric WQBELs were necessary.

Compilation of Data

As there is currently no discharge from the proposed facility, data from two (2) onsite groundwater monitoring wells (i.e., DSWW17-01 and PW22-01) were used for the RPA. Data collected from the wells are representative of the quality of groundwater to be intercepted. Data from these two (2) wells were collected from August 2018 to August 2025. For the purposes of the RPA, the following values for censored data were used:

- If data were censored at the method detection limit (MDL) (i.e., the MDL is used as the reporting limit) and were indicated as “not detected” (ND) at this level, the value of the MDL was used as a proxy value for the ND result.
- If data were reported at a value greater than the MDL, but less than the quantitation limit (typically, the minimum level), the reported value¹ was used.
- If data were censored at the quantitation limit (i.e., the quantitation limit is used as a reporting limit), a value of one-half the quantitation limit was used as a proxy value for the ND result.

Additionally, where the dissolved concentrations were reported for arsenic, cadmium, copper, lead, mercury, nickel, silver, and zinc, the RPA Tool used by NDEP automatically converts these metals into the total recoverable concentration using default conversion factors found in Attachment B.

Conducting the RPA

For conducting the RPA, NDEP used a mass-balanced approach to determine the expected critical downstream receiving water concentration using statistics recommended in the United States Environmental Protection Agency’s Technical Support Document (TSD) for Water Quality-Based Toxic Control for statistically calculating the projected maximum effluent concentration (i.e., Table 31 of the TSD using the 99 percent probability basis and 99 percent confidence interval). For purposes of the RPA, the critical receiving water flow was assumed to be zero (i.e., no dilution); therefore, the critical effluent pollutant concentrations were compared with the most restricted water quality criteria (i.e., IBVs) to determine if the discharge has reasonable potential to cause, or contribute to, an excursion above the developed IBVs.

¹ This value should be qualified by the laboratory as “estimated” and have an associated data qualifier (e.g., J-qualified).

Conclusion

Based on the RPA, the proposed discharge exhibits the reasonable potential to cause, or contribute to, an in-stream excursion above the developed IBVs for antimony, arsenic, barium, iron, manganese, thallium, fluoride, and sulfate (see Attachment C). Therefore, the IBVs for these constituents are included in the proposed permit as daily maximum limits.

Attachment A

Parameter of Concern	Unit	Interim Baseline Values
Antimony, Total Recoverable	ug/L	14.6
Arsenic, Total Recoverable	ug/L	29
Barium, Total Recoverable	ug/L	200
Beryllium, Total Recoverable	ug/L	0.5
Boron, Total Recoverable	ug/L	75
Cadmium, Total Recoverable	ug/L	0.5
Cadmium, Dissolved	ug/L	0.5
Chromium, Total	ug/L	10
Copper, Total Recoverable	ug/L	20
Copper, Dissolved	ug/L	20
Fluoride, Total Recoverable	ug/L	357
Iron, Total Recoverable	ug/L	875
Lead, Total Recoverable	ug/L	5
Lead, Dissolved	ug/L	11.6
Manganese, Total Recoverable	ug/L	115
Mercury, Total Recoverable	ug/L	0.23
Mercury, Dissolved	ug/L	0.23
Molybdenum, Total Recoverable	ug/L	165
Nickel, Total Recoverable	ug/L	13.4
Nickel, Dissolved	ug/L	74.3
Selenium, Total Recoverable	ug/L	2.5
Silver, Dissolved	ug/L	0.07
Thallium, Total Recoverable	ug/L	1.3
Zinc, Total Recoverable	ug/L	200
Zinc, Dissolved	ug/L	18.6
Chloride	mg/L	23
Dissolved Oxygen	mg/L	6
Nitrate	mg/L	1
Nitrite	mg/L	0.05
Phosphorus, Total	mg/L	0.1
Sulfate	mg/L	25
Alkalinity, Total	mg/L	91
Solids, Dissolved Total	mg/L	239
Solids, Suspended Total	mg/L	25
Turbidity	NTU	10
Ammonia, Total	mg/L	0.146
Color	PCU	44
Temperature	°C	20

Attachment B

Metal	Conversion Factors	
	Acute (1-Hour Average) Criteria	Chronic (96-Hour Average) Criteria
Arsenic	1.000	1.000
Cadmium	$1.136672 - [(\ln \text{ hardness})(0.041838)]$	$1.101672 - [(\ln \text{ hardness})(0.041838)]$
Copper	0.960	0.960
Lead	$1.46203 - [(\ln \text{ hardness})(0.145712)]$	$1.46203 - [(\ln \text{ hardness})(0.145712)]$
Mercury	0.85	0.85
Nickel	0.998	0.997
Silver	0.85	--
Zinc	0.978	0.986

Note: To convert data from dissolved to total recoverable, divide the value by the corresponding conversion factor.

Nevada Division of Environmental Protection RPA Tool
RPA Summary

Attachment C

Summary of Reasonable Potential Analysis

Parameter	Units	No. of Effluent Samples	Critical Effluent Concentration	Most Stringent Criterion	Criterion Basis	Does RP Exist?
Metals (Total Recoverable), Cyanide and Phenols						
Antimony, Total Recoverable	ug/L	4	42.62	14.6	RMHQ	Yes
Arsenic, Total Recoverable	ug/L	22	145.3	29	RMHQ	Yes
Barium, Total Recoverable	ug/L	4	663.0	200	RMHQ	Yes
Iron, Total Recoverable	ug/L	22	1,660.5	875	RMHQ	Yes
Lead, Total Recoverable	ug/L	22	3.787	5	RMHQ	No
Manganese, Total Recoverable	ug/L	22	220.22	115	RMHQ	Yes
Thallium, Total Recoverable	ug/L	4	7.6	1.3	RMHQ	Yes
Zinc, Total Recoverable	ug/L	22	86.9	190	Acute Aquatic Life	No
Other Pollutants						
Chloride	mg/L	21	4.82	23	RMHQ	No
Fluoride	ug/L	19	700.90	357	RMHQ	Yes
Sulfate	mg/L	21	40.80	25	RMHQ	Yes
Total Dissolved Solids	mg/L	21	197.44	239	RMHQ	No

Development of Interim Baseline Water Quality Values for Antidegradation Review – South Railroad Mine

Introduction

Gold Standard Ventures (US), Inc. (GSV) applied for a new National Pollutant Discharge Elimination System (NPDES) permit (NV0024267) for the South Railroad Mine project on September 19, 2025. The project proposes to discharge treated, intercepted groundwater to an unnamed tributary of Dixie Creek. Because this discharge represents a new point source, the Nevada Division of Environmental Protection (NDEP) must conduct an antidegradation review for each parameter of concern that is expected to be present in the point source discharge, as required by NAC 445A.3046.1(a).

The applicable water quality standards for the receiving water, the unnamed tributary of Dixie Creek, are contained in NAC 445A.1466 (Humboldt River, South Fork at the Humboldt River). NAC 445A.1466 does not contain any requirement to maintain existing high water quality (NAC 445A.3038). Therefore, NDEP was required to calculate interim baseline values (IBVs) for each parameter of concern expected to be present in the proposed discharge.

NDEP performed this work in accordance with Nevada’s antidegradation regulation (Nevada Administrative Code (NAC) 445A.303 to 445A.3049), Nevada’s Antidegradation Implementation Procedures, and Nevada’s Antidegradation Permit Writers’ Guidance.

Sampling and Analysis Plan and Data Collection

Nevada’s antidegradation regulation (R113-22) was adopted by the Nevada State Environmental Commission on March 21, 2024 and approved by USEPA on June 10, 2025, becoming immediately effective for Clean Water Act purposes. However, the Dark Star-Pinion Groundwater and Surface Water Monitoring Plan used by GSV is dated May 8, 2018, before adoption of Nevada’s antidegradation regulation.

Surface water data was collected by GSV within the unnamed tributary of Dixie Creek between August 1, 2018 and October 24, 2024. Because the sampling plan and its implementation predated the antidegradation regulation, NDEP reviewed it retrospectively to determine whether the existing dataset could be used to establish IBVs. NDEP concluded the plan and its implementation was generally satisfactory, but noted several important limitations:

- No single monitoring location contained sufficient data to establish IBVs for all parameters of concern expected to be in the proposed discharge.
- Dix-6 samples (2022-2024) were collected approximately monthly, with gaps during the winter. Even though sampling did not meet the minimum regulatory frequency of “approximately every 90 days” required under NAC 445A.3035, NDEP determined

that the dataset was unbiased and sufficiently seasonally representative for IBV development.

- ST6 samples (2018-2024) were collected approximately two to three times per year, mostly during summer and fall. As with Dix-6, NDEP determined that the ST6 dataset was unbiased and sufficiently seasonally representative, despite not meeting the NAC 445A.3035 sampling frequency requirement.

These considerations provide necessary context for understanding how IBVs were derived and why certain datasets were used.

Methodology for Calculating IBVs

Step 1: Identify the parameters of concern

Under NAC 445A.3037, parameters of concern include:

- All parameters with water quality criteria in NAC 445A.11704 through 445A.2234, and
- Any additional parameters determined by the Department to be of concern.

For this project:

- All parameters listed in NAC 445A.1466 are considered parameters of concern.
 - *E. coli* and fecal coliform were excluded because they are not expected in intercepted groundwater.
 - Cyanide and organic chemicals listed in NAC 445A.1236 were excluded based on land use history and groundwater conditions.

Steps 2 and 3: Establish IBVs and Determine Tier of Antidegradation Protection

Prior to calculating IBVs, NDEP first had to select a surface water monitoring location where IBVs could be established. NDEP determined that Dix-6 is the most appropriate monitoring location to establish IBVs. The dataset for Dix-6 is sufficient to establish IBVs for all parameters of concern except dissolved metals. To address this limitation, NDEP selected ST6 as the most appropriate monitoring location to establish IBVs for dissolved metals based on location and completeness of the dataset.

IBVs were based on 23 Dix-6 samples and 19 ST6 samples (dissolved metals only).

IBVs were calculated according to the instructions in Nevada's Antidegradation Permit Writers' Guidance:

“Based on the data compiled from the existing data sources and additional data collection, the permit writer should calculate an IBV for each parameter of concern. The IBV should be set at the extrapolated 95th-percentile value.¹

For purposes of calculating the IBV, the permit writer should use the following values for censored data:

- *If data are censored at the method detection limit (MDL) (i.e., the MDL is used as the reporting limit) and are indicated as “not detected” at this level, the value of the MDL should be used as a proxy value for the non-detected result.*
- *If data are reported at a value greater than the MDL, but less than the quantitation limit (typically, the minimum level), the reported value² should be used.*
- *If data are censored at the quantitation limit (i.e., the quantitation limit is used as a reporting limit), a value of one-half the quantitation limit should be used as a proxy value for the non-detected result.*

Some parameters, such as total dissolved solids, chloride and sulfate, have relatively high water quality criteria to protect beneficial uses. For such parameters, the IBV should not be established at less than 10 percent of the water quality criterion. For example, if the water quality criterion for sulfate is 250 mg/L, the lowest IBV that should be established is 25 mg/L.”

Consistent with the way RMHQs have historically been established³, this methodology was included in Nevada’s Antidegradation Implementation Procedures which were required to be submitted to EPA and are formal component of Nevada’s approved Antidegradation rulemaking package.

It should be noted that IBV values for dissolved oxygen and total alkalinity are calculated at the 5th percentile instead of the 95th percentile because their corresponding water quality standards are set as the lower limit for that constituent (i.e. $\geq$) instead of the upper limit ($\leq$). Consistently, the IBV for these constituents should not be more than 10 times the criterion, instead of no less than 10% of the criterion.

In cases where both acute and chronic water quality criteria exist for a parameter of concern, the chronic criterion was utilized due to the discharge duration.

¹ The “extrapolated 95th percentile” is calculated using the =PERCENTILE.INC(ARRAY,0.95) function in Excel. For example, using three results (10, 10, 20 mg/L) yields an extrapolated 95th percentile of 19.0 mg/L.

² This value should be qualified by the laboratory as “estimated” and have an associated data qualifier (e.g., J-qualified).

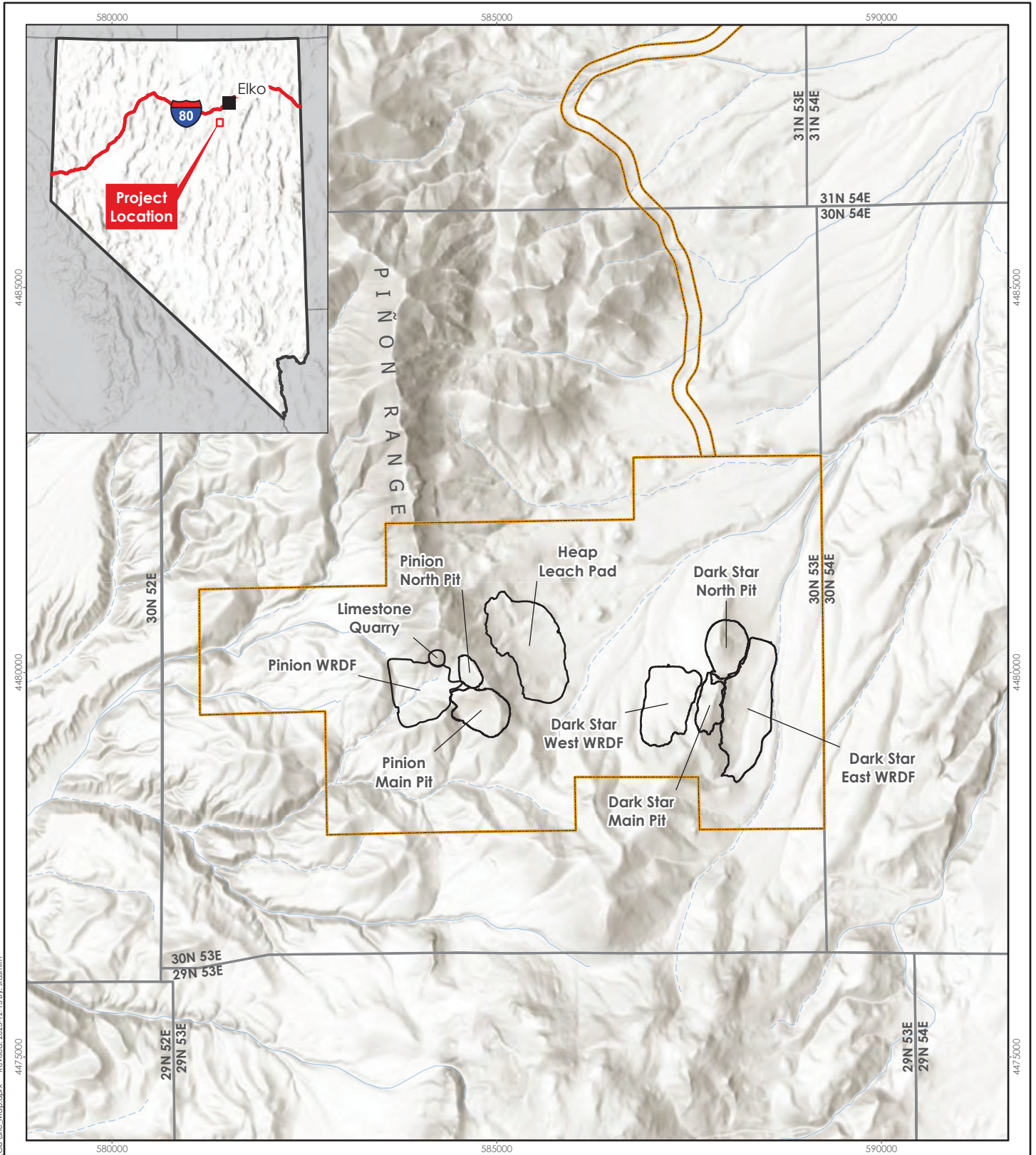
³ Nevada’s Continuing Planning Process (January 2007)

Conclusion

The IBVs calculated for parameters of concern (Attachment B) associated with the South Railroad Mine project were calculated using the best available data collected prior to adoption of Nevada's antidegradation regulation. NDEP followed the regulatory requirements and guidance, applied scientifically defensible methods, and selected appropriate monitoring locations with the most complete and seasonally representative datasets. The resulting IBVs form the foundation of the antidegradation review required for this new point source discharge and will inform development of NPDES permit conditions necessary to ensure protection of the receiving water.

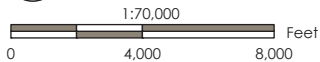
ATTACHMENT A

Monitoring Location Maps



Legend

- Proposed Mine Facilities
- Mine Permit Area



T30N, R53E Elko County, NV
NAD 1983 UTM Zone 11N

DRAWN BY: NS

1ST REVIEW: SS

2ND REVIEW: RP

DATE: 12/15/2025

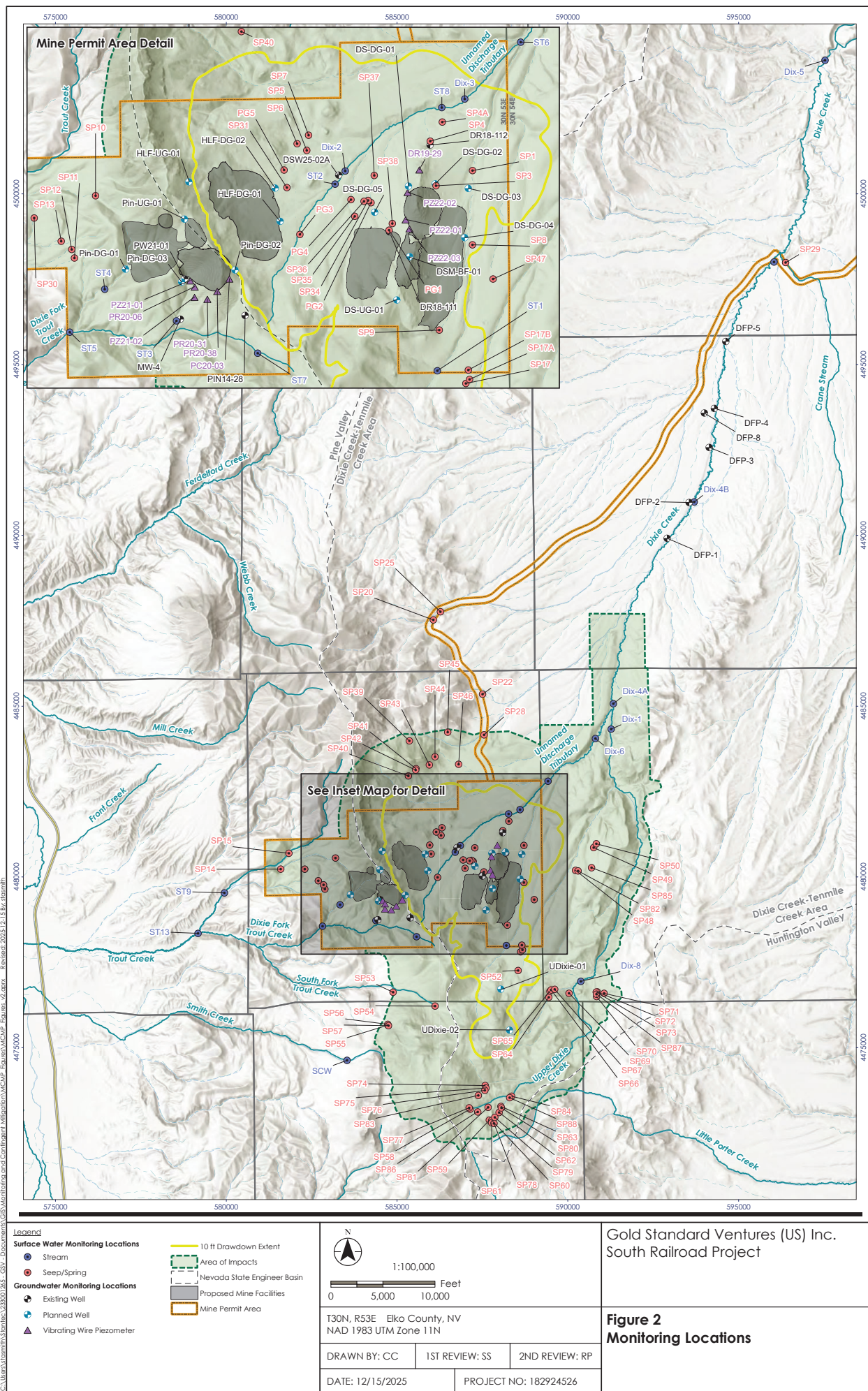
PROJECT NO: 182924526

Gold Standard Ventures (US) Inc.
South Railroad Project

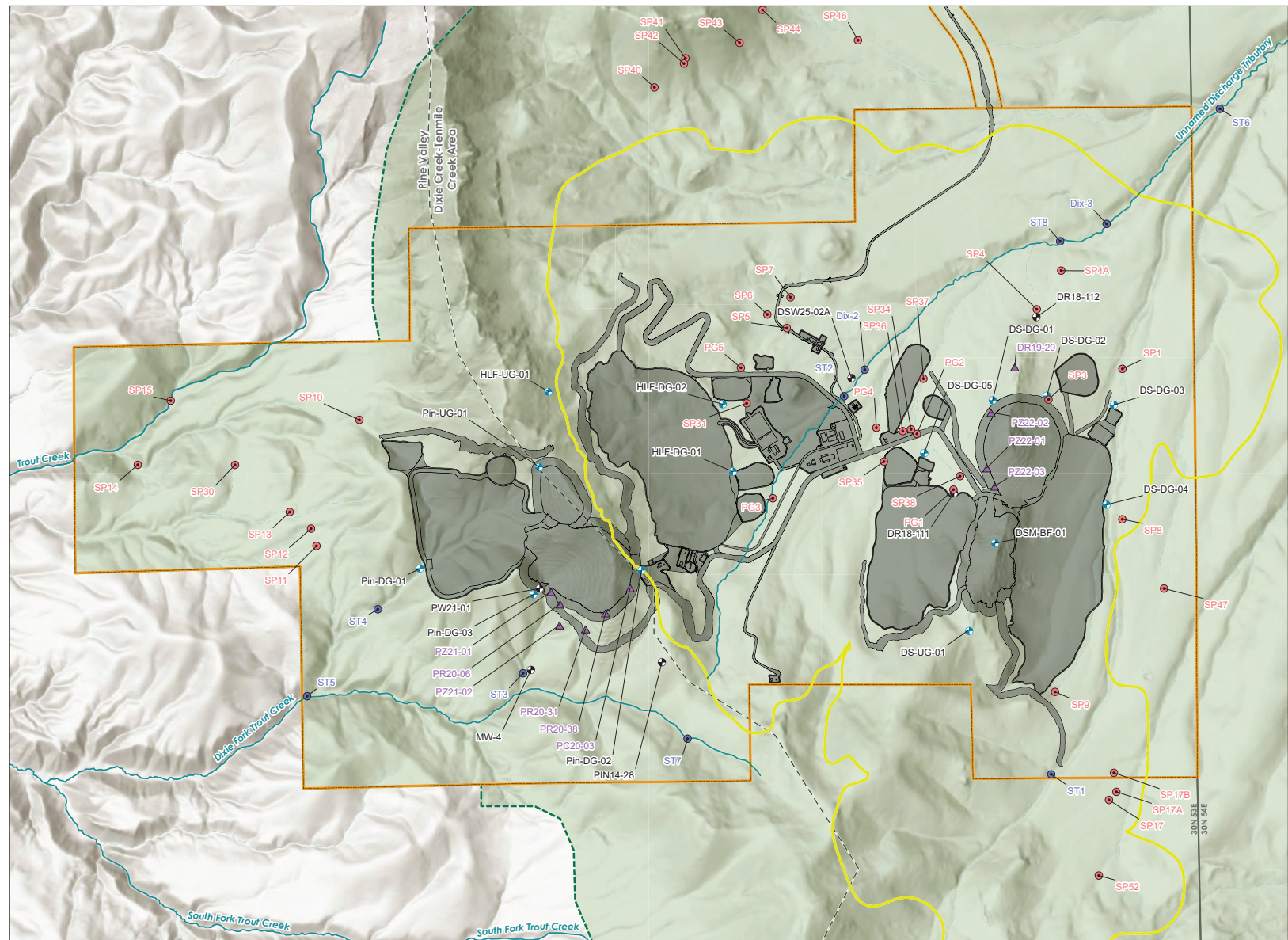
Figure 1 Site Overview

Notes: WRDF = waste rock disposal facility

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- Legend**
- Surface Water Monitoring Locations**
- Seep/Spring
 - Stream
- Groundwater Monitoring Locations**
- Existing
 - Planned
 - Vibrating Wire Piezometer
- NHD Streams
 Unnamed NHD Stream
 10 ft Drawdown Extent
 Nevada State Engineer Basin Boundary
 Area of Impacts
 Proposed Mine Facilities
 Mine Permit Boundary

0 1,000 2,000 Feet
 1:28,000

Stantec

T30N, R53E
 Elko County, NV
 NAD 1983 UTM Zone 11N

PROJECT NO: 182924526
 DRAWN BY: NS
 1ST REVIEW: SS
 2ND REVIEW: RP
 DATE: 12/16/2025

Gold Standard Ventures (US) Inc.
 South Railroad Project

Figure 3
Permit Area Monitoring
Locations

ATTACHMENT B

Interim Baseline Values Calculated for Parameters of Concern

IBVs Based on Dix-6 Monitoring Data

Parameter of Concern	Antimony (µg/L)	Arsenic (µg/L)	Barium (µg/L)	Beryllium (µg/L)	Boron (µg/L)	Cadmium (µg/L)	Chromium (total) (µg/L)
Number of Samples	23	23	23	23	23	23	23
95th Percentile	1.3	29	200	0.5	50	0.5	4.8
WQ criterion	146	50	2000	4	750	5	100
95 th percentile < 10% of WQ criterion	Yes	No	Yes	No	Yes	No	Yes
Level of Antidegradation Protection	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2
Interim Baseline Value	14.6	29	200	0.5	75	0.5	10

Parameter of Concern	Copper (µg/L)	Fluoride (µg/L)	Iron (µg/L)	Lead (µg/L)	Manganese (µg/L)	Mercury (µg/L)	Molybdenum (µg/L)
Number of Samples	23	23	23	23	23	23	23
95th Percentile	20	357	875	1.3	115	0.23	10
WQ criterion	200	1000	1000	50	200	2	1650
95 th percentile < 10% of WQ criterion	No	No	No	Yes	No	No	Yes
Level of Antidegradation Protection	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2
Interim Baseline Value	20	357	875	5	115	0.23	165

Parameter of Concern	Nickel (µg/L)	Selenium (µg/L)	Thallium (µg/L)	Zinc (µg/L)
Number of Samples	23	23	23	23
95th Percentile	15.0	2.5	0.5	19
WQ criterion	13.4	3.9	13	2000
95 th percentile < 10% of WQ criterion	No	No	Yes	Yes
Level of Antidegradation Protection	Tier 1	Tier 2	Tier 2	Tier 2
Interim Baseline Value	13.4	2.5	1.3	200

Parameter of Concern	Chloride (mg/L)	Dissolved Oxygen ¹ (mg/L)	Nitrate ² (mg/L)	Nitrite ³ (mg/L)	Total Phosphorus (mg/L)	Sulfate (mg/L)	Total Alkalinity ¹ (mg/L)
Number of Samples	23	23	23	35	23	23	23
95th Percentile ¹	6.8	2.5	0.24	0.05	0.48	25	91
WQ criterion	230	6.0	10	0.06	0.10	250	20
95 th percentile < 10% of WQ criterion	Yes	No	Yes	No	No	Yes	No
Level of Antidegradation Protection	Tier 2	Tier 1	Tier 2	Tier 2	Tier 1	Tier 2	Tier 2
Interim Baseline Value	23	6.0	1.0	0.05	0.10	25	91

¹ Values for Dissolved Oxygen and Total Alkalinity are calculated at the 5th Percentile instead of the 95th percentile because they have a greater than or equal to ($\geq$) instead of a less than or equal to ($\leq$) criterion. To determine the IBV for these constituents, the 5th percentile is compared against 10 times the criterion instead of 10% of the criterion.

² The IBV for Nitrate was calculated using the Nitrate+Nitrite N data provided by GSV. Nitrite (NO₂) is unstable and rapidly converts to Nitrate (NO₃) in oxygenated water, it is usually present in much lower concentrations, making the combined total effectively represent the Nitrate concentration.

³ The Nitrate IBV was calculated using NDEP data from Dixie Creek.

Parameter of Concern	TDS (mg/L)	TSS (mg/L)	Turbidity ⁵ (NTU)	Total Ammonia ⁶ (mg/L)	Color ⁷ (PCU)	Temperature (°C)
Number of Samples	23	22	51	29	26	23
95th Percentile	239	31	221	0.05	44	24
WQ criterion	500	25	10	1.46	75	20
95 th percentile < 10% of WQ criterion	No	No	No	Yes	No	No
Level of Antidegradation Protection	Tier 2	Tier 1	Tier 1	Tier 2	Tier 2	Tier 1
Interim Baseline Value	239	25	10	0.146	44	20

⁵ The Turbidity IBV was calculated using NDEP data from Dixie Creek.

⁶ The Ammonia (total) IBV was calculated using NDEP data from Dixie Creek.

⁷ The Color IBV was calculated using NDEP data from Dixie Creek.

IBVs Based on ST6 Monitoring Data

Parameter of Concern	Cadmium Dissolved ⁸ (µg/L)	Copper Dissolved ⁸ (µg/L)	Lead Dissolved ⁸ (µg/L)	Mercury Dissolved (µg/L)	Nickel Dissolved ⁸ (µg/L)	Silver Dissolved ⁸ (µg/L)	Zinc Dissolved ⁸ (µg/L)
Number of Samples	19	19	19	19	19	19	19
95th Percentile	0.5	20.0	1.25	0.23	15	2.5	12.3
WQ criterion	3.0	22.5	116	0.77	743	0.07	186
95 th percentile < 10% of WQ criterion	No	No	Yes	No	Yes	No	Yes
Level of Antidegradation Protection	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 1	Tier 2
Interim Baseline Value	0.5	20.0	11.6	0.23	74.3	0.07	18.6

⁸ Water quality criterion for the constituent is calculated based on hardness. Based on 19 samples, the 95th percentile for hardness was calculated at 172.56 µg/L.