

## 4.6. GEOLOGY, SOILS, AND MINERAL RESOURCES

### 4.6.1 INTRODUCTION

The Geology, Soils, and Mineral Resources chapter of the EIR describes the geologic and soil characteristics of the Centennial and Brunswick Industrial Sites and evaluates the extent to which implementation of the proposed project could be affected by unstable earth conditions and various geologic hazards, including near-surface mine features. In addition, the chapter identifies known mineral resources on the Centennial and Brunswick Industrial Sites and any potential adverse effects of the proposed project on the availability of such resources. Paleontological resources are also discussed in this chapter.

Information from this chapter is primarily drawn from the following sources:

- NV5. *Geotechnical Engineering Report, Idaho-Maryland Mine Project – Brunswick Industrial Site*. November 18, 2019 (Appendix H.1).
- NV5. *Idaho-Maryland Mine Project – Portion of Brunswick Industrial Site: Management Plan for Potential Seismic Hazards*. January 16, 2020 (Appendix H.2). Referred to as “Brunswick Management Plan for Potential Seismic Hazards (2020)” hereafter in this chapter.
- NV5. *Idaho-Maryland Mine Project – Brunswick Industrial Site: Management Plan for Steep Slopes and High Erosion Potential*. December 21, 2020 (Appendix H.3). Referred to as “Management Plan for Steep Slopes and High Erosion Potential (Brunswick Industrial Site, 2020)” hereafter in this chapter.
- NV5. *Geotechnical Engineering Report, Idaho-Maryland Mine Project – Centennial Industrial Site*. December 20, 2019 (Appendix H.4).
- NV5. *Idaho-Maryland Mine Project – Centennial Industrial Site: Management Plan for Steep Slopes and High Erosion Potential*. December 21, 2020 (Appendix H.5). Referred to as “Management Plan for Steep Slopes and High Erosion Potential (Centennial Industrial Site, 2020)” hereafter in this chapter.
- NV5. *Idaho-Maryland Mine Project: Geotechnical Assessment of Near Surface Mine Features*. Revised September 11, 2020 (Appendix H.6).
- ECM. *Applicant Report Peer Review, Idaho Maryland Mine: Centennial and Brunswick Sites*. August 13, 2020 (Appendix H.7).
- Navo & Son, Inc. *12791 Brunswick Rd. Septic System Analysis*. October 28, 2019. (Appendix H.8)

### 4.6.2 EXISTING ENVIRONMENTAL SETTING

Background setting information regarding the geology, soils, seismicity, mineral resources, and paleontological resources associated with the project site and the surrounding region is provided below.

#### **Regional Geology**

The Centennial and Brunswick Industrial Sites are located within a region underlain by a complex assemblage of igneous and metamorphic rocks in the western foothills of the Sierra Nevada. The regional structure of the foothills is characterized by the north-northwest trending Foothills Fault System, a feature formed during the Mesozoic era in a compressional tectonic environment.



## **Project Site Characteristics**

The geologic conditions characterizing the Centennial and Brunswick Industrial Sites are discussed below, including descriptions of existing site geology, soil conditions, seismicity and ground shaking, potential for earthquake-induced liquefaction, and expansive soils. In addition, this section includes a description of known mineral and paleontological resources within the project area.

### **Site Geology**

The following section describes the geology present at the Centennial Industrial Site and the Brunswick Industrial Site.

#### **Centennial Industrial Site**

According to Saucedo and Wagner (1981), the Centennial Industrial Site location is underlain by gabbro and ultramafic rocks associated with the Lake Combie complex. Tuminas (1983) depicts the western quarter of the Site location as being underlain by ultramafic rocks and the remainder of the Site as underlain by gabbro.

Johnston (1939) depicts the historic Maryland Mine approximately 400 feet northeast of the Site, located on a gold-bearing quartz vein that dips beneath the Site at an angle of 50 to 70 degrees.

#### **Brunswick Industrial Site**

According to the Geologic Map of the Chico Quadrangle (California Department of Conservation, Division of Mines and Geology [CDMG], 1992), the northern and central portions of the Brunswick Industrial Site are underlain by massive diabase, and the southeastern portion of the Site is underlain by metavolcanic rocks. Both of these units are associated with the Mesozoic Lake Combie Complex. The south and southwestern portions of the Site are mapped as Miocene to Pliocene volcanics, predominantly andesitic pyroclastic rocks.

The Geologic Map of the Grass Valley – Colfax Area (A. Tuminas, 1983) presents the findings of a more detailed local study. According to this geologic map, four rock units are mapped as underlying the Site. The eastern portion of the Site is mapped as early Mesozoic Lake Combie metavolcanic rock; the northern and western sloping flanks are mapped as early Mesozoic Lake Combie massive diabase; the lower valley portions encompassing the South Fork of Wolf Creek are mapped as Quaternary Alluvium (i.e., water lain sediments); and tertiary clastic strata of the volcanic Mehrten formation is mapped in the south and southwestern portions of the Site.

### **Seismicity**

The Fault Activity Map of California (2010) (<http://maps.conservation.ca.gov/cgs/fam/>), prepared by the California Department of Conservation, California Geological Survey (CGS), indicates that the overall project site is located within the Foothills Fault System. The Foothills Fault System is designated as a Type C fault zone, with low seismicity and a low rate of recurrence. The Foothills Fault System has been assigned a moment magnitude of 6.5. The nearest mapped active portion of the Foothill Fault System is approximately 25 miles northwest of the overall project site on the Cleveland Hill Fault.

NV5 also reviewed the CGS Open File Report 96-08, Probabilistic Seismic Hazard Assessment for the State of California, the 2002 update entitled California Fault Parameters, and the Official Maps of Earthquake Fault Zones delineated by the CGS through December 2010. The 1997



edition of CGS Special Publication 42, Fault Rupture Hazard Zones in California, describes active faults and fault zones (activity within 11,000 years), as part of the Alquist-Priolo Earthquake Fault Zoning Act. The maps and documents all indicate the project site is not located within an (Alquist-Priolo) active fault zone.

According to the Geologic Map of the Chico Quadrangle, California (CDMG, 1992, 1:250,000), a northwest trending liniment of the Grass Valley Fault Zone is approximately located or inferred along Brunswick Road east of the Brunswick Industrial Site.

The Geologic Map of the Grass Valley - Colfax Area (A. Tuminas, 1983) presents the findings of a more detailed local study. According to this geologic map, an inferred fault trends north-northwest through the Brunswick Industrial Site property approximately along the eastern shore of the pond and passing through the northern Site boundary.

The NV5 report, entitled *Idaho-Maryland Mine Project – Portion of Brunswick Industrial Site: Management Plan for Potential Seismic Hazards*,<sup>1</sup> includes a 1986 report by Anderson Geotechnical Consultants, Inc., which contains a one-inch equals 100 feet scale map dated January 1987 by A. W. Beeson and Associates. The Beeson map shows a dashed line labeled “fault line per Anderson Geotechnical Report”, likely referring to a report produced by Anderson in February 1986, although the original has not been located.

ECM, during its peer review of NV5’s Management Plan for Potential Seismic Hazards, reviewed the 1992 Geologic Map of the Chico Quadrangle (California Department of Conservation [DOC], Saucedo and Wagner) and the Special Report 164, State Map DRG SM-164, Mineral Land Classification of Nevada County, California, California Department of Conservation Division of Mines and Geology, Scale of 1:48,000, by Loyd and Clinkenbeard, 1990 (incorporates results of Tuminas, 1983). Based on their review, ECM concluded the following:<sup>2</sup>

Both of the two small-scale maps [Geologic Map of Chico Quadrangle, DOC, 1992; Special Report 164 (DOC), Lloyd and Clinkenbeard, 1990] depict an unnamed north-northwest trending fault in the vicinity of the [Brunswick] site. Both maps depict the feature as a dashed line meaning that the fault is believed to exist, but its location is approximate. This fault, as shown on the Saucedo and Wagner map, locates it only approximately somewhere within the valley formed by the South Fork of Wolf Creek. The scale of the Loyd and Clinkenbeard map is larger, and the topographic detail is sufficient to show the inferred fault to be located on the east side of Brunswick Road. Note that at the scale of a 1:250,000 map, the width of the line on the Chico map is about 600 feet, and at a scale of 1:48,000, the line width on the Loyd and Clinkenbeard map is about 150 feet. The Loyd and Clinkenbeard map shows the unnamed fault to be located east of Brunswick Road, placing it about 600 feet east of the New Brunswick Shaft and off of the property. Thus, even if the location of the fault were precisely known, its plotted location on the Loyd and Clinkenbeard map would only be within 150 feet of its actual location on the ground, and since it is shown on the maps as being inferred, the actual location might be even farther away. No other information for this feature such as measured strike, dip or relative movement has been found.

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<sup>1</sup> NV5. *Idaho-Maryland Mine Project – Portion of Brunswick Industrial Site: Management Plan for Potential Seismic Hazards*. January 16, 2020.

<sup>2</sup> ECM. *Applicant Report Peer Review, Idaho Maryland Mine: Centennial and Brunswick Sites* [pg. 15]. August 13, 2020.



Anderson Geotechnical Consultants (May 1986 report) investigated two sites, one in the vicinity of the New Brunswick shaft (Lots 6, 7 and 8), and a second site located near the old Brunswick shaft (Lots 1 through 5). It appears that they used old historic maps to locate mining related structures including surface buildings and underground openings. They drilled six test borings on Lots 1 through 5 at the Old Brunswick shaft and referenced a February 1986 report that included details for the area around the New Brunswick Shaft. While that February 1986 report was not available for review, the NV5 report did discuss the findings in that report, and included a map dated January 1987 that was drawn up by A. W. Beeson. That Beeson map showed the location of where Anderson had believed a fault to be, and depicted it as a straight dashed line with two parallel lines located 200 feet either side, showing, presumably Anderson's suggested setback distances for building construction. The map shows the feature to strike north north-west, and to be dominantly located in Lot 8, cutting across a portion of Lot 7. Anderson stated in his May 1986 report that he had previously described it in his February report stating the fault "appears to be present on the northern part of the lot", which we interpret to mean that the presence of the fault is "inferred" and its presence and location has not necessarily been proven. The Beeson map depicts the feature as straight-line crossing through the entire length of the lot, which is slightly different than Anderson's description. ECM believes that if the feature had been mapped in any detail, and confirmed by Anderson, that it would have been depicted on the map as a solid line instead of a dashed line.

The basic definition of a fault is important for discussion. A fault is defined as a fracture on which movement has occurred. This movement might be as little as a few microns, or as large as thousands of feet as might be associated with earth scale tectonic features. Smaller displacement faults are common across the entire Earth, and can be the result of localized stress relief that occurred during the original placement of the rocks, or from other local inhomogeneities that occur during erosion, or old tectonic activity. In all of these cases, even though they might exist, they do not necessarily have to have any recent movement. A fault likely does exist somewhere in the vicinity of the three different inferred locations discussed above. The question then arises as to whether it might have been active in recent times. NV5 believes the feature formed during the Mesozoic era, at least 65 million years ago. They consider it inactive and designate it as a Type C fault zone "with a low seismicity and a low rate of occurrence". Based on ECM's knowledge of the geology of the area, we are in agreement with NV5's conclusion, and no evidence has been found that suggests there might have been any recent fault movement in the general site area. In support of NV5's and ECM's conclusion, further review of the Chico quadrangle map shows that Saucedo and Wagner's interpretation of the fault shows it to terminate at the north edge of mapped Tertiary volcanics (MPv), at a location a little over a half mile south of the New Brunswick Shaft. Since the map does not show the fault crossing the volcanic unit, we conclude that there has been no fault movement to break the overlying Miocene volcanic rock since its deposition in the Miocene Epoch 5 to 23 million years ago. If otherwise, the overlying Miocene volcanic unit would also be displaced, or at least fractured.

As the most recent evidence, both surface and underground miners have been working in the Grass Valley area at the various mines since the mid 1860's provides over 150 years of observation. We have found no records that indicate that any movement has occurred on any faults at or near the site. This conclusion is also consistent with the conclusions reached by the State of California as related to Earthquake Zones, as shown on the California Earthquake Zone Database.



Based on the information that has been presented, there is likely a fault located on or near the site within 600 feet of the New Brunswick shaft. The nearby 5 to 23 million-year-old volcanics located over the inferred location of the fault show no fracturing, thus this is indicative that no movement had occurred more recently. From a modern perspective, the existing New Brunswick shaft and its various ancillary facilities have been in place for over 150 years, and have never reported any seismic damage, nor have any historic reports been found that might indicate modern seismic activity. Whether or not a fault might exist, there is no evidence that this area is now seismically active...

### **Site Soil Conditions**

The soil condition discussion for the Centennial Industrial Site needs to be qualified by the proposed site remediation work discussed in the Introduction chapter of this EIR. As noted therein, Rise Grass Valley Inc. entered into a Voluntary Cleanup Agreement (VCA; Docket No. HSA-FY18/19-014) with the Department of Toxic Substances Control (DTSC) for the voluntary cleanup of soil contamination on the Centennial Industrial Site. The DTSC cleanup project is separate from the Idaho Maryland Mine project and is not dependent on the approval of the Idaho Maryland Mine. Extensive site investigation, overseen by DTSC, has identified mill tailings, waste rock and affected soil at the site that contain lead, arsenic, mercury and other metals at concentrations exceeding background soil metals concentrations and regulatory benchmark concentrations. A Centennial Industrial Site Remedial Action Plan (RAP; 2020) has been prepared by NV5, on behalf of Rise, and describes the proposed procedures for conducting remedial activities needed to meet Remedial Action Objectives (RAO's).

More specifically, the remedial action includes excavation of soils within the former eastern and western tailing ponds and on-site consolidation of contaminated materials, as well as stabilization of contaminated materials within a small hot spot area by cement treatment prior to on-site consolidation. Other contaminated soils from the former tailing ponds that do not pose potential water quality impacts will be placed within the consolidation area as engineered fill without cement treatment. The 5.6-acre consolidation area would be located along the eastern boundary of the Centennial Industrial Site and capped with four feet of clean engineered soil, with the end result being an engineered fill pad.

The excavation areas would be backfilled and regraded with clean fill to promote drainage, and erosion controls will be installed. The engineered fill pad would be graded so that runoff would drain away from the fill slope into surface and subsurface drainage controls. Following completion of excavation, stabilization, and placement activities disturbed areas will be hydroseeded or broadcast seeded with an erosion-control native seed mix to reduce erosion and maintain fill slope stability.

The overall area to be remediated and regraded is currently estimated to be approximately 28 acres of the approximate 56-acre site. Such work will remove a portion of the on-site erodible soils and steep slopes (exceeding gradients of 30 percent) currently located on-site. The post-remediation acreage of highly erodible soils and steep slopes on the Centennial Industrial Site cannot be precisely established for the baseline condition given that final disturbance acreages as a result of remediation activities may vary from current estimates. DTSC, as the CEQA lead agency for approval of the RAP and its associated CEQA document, will separately require the applicant to mitigate impacts related to soil erosion and work within steep slope areas resulting from remediation activities. For example, Appendix E of the RAP contains a Storm Water Pollution Prevention Plan (SWPPP). The RAP outlines best management practices to be implemented to



reduce the potential chance of sediment discharge. After excavation, verification that RAOs have been achieved, and consultation with DTSC, the excavation areas will be re-graded to promote drainage, and erosion controls will be installed. Where appropriate, site restoration activities will include broadcasting seed, fertilizer and straw within the excavation footprint for erosion control measures. Fiber wattles and/or silt fencing will be placed along the perimeter of the down slope sides of the disturbed areas pursuant to the design drawings and the SWPPP.

### Centennial Industrial Site

According to the Web Soil Survey (United States Department of Agriculture [USDA] Natural Resource Conservation Service [NRCS]), the Site location is mapped predominantly as Placer Diggings, which is described by the soil survey as “hydraulically-mined areas, placer-mined areas along stream channels, and areas of natural deposits along the stream channels.”<sup>3</sup> (see Figure 4.6-1). The soil survey does not rate the Placer Diggings soil class for erosion hazard potential. The locations mapped as Placer Diggings are actually comprised of hardrock mine tailings resulting from historical hardrock mining activities. The Site is historically associated with the Idaho Maryland Mine, a former underground hardrock (lode) gold mining operation. Mining and milling structures associated with the former mine were generally located to the east of the Site, and the Site was used primarily for disposal of mine waste (tailings and waste rock) to land.

The majority of the Placer Diggings soils would be disturbed during remediation activities at the Centennial Industrial Site under DTSC oversight pursuant to the RAP; some portions of the Placer Diggings soil areas would be moved to the encapsulated mine waste area along the Site’s eastern boundary, and other portions would be used as borrow areas for the regrading of remediated areas. Upon removal/relocation of the aforementioned Placer Diggings soils, it is anticipated that the underlying soil would still be comprised of tailings.

Soil conditions near the southern Site boundary are mapped as Secca-Rock outcrop complex, which is described as moderately well-drained soil underlain by metabasic or basic rock. According to the soil survey, weathered rock is typically encountered at a depth of approximately four feet below the ground surface (bgs) in areas mapped as Secca-Rock outcrop complex, and rock outcrop typically comprises 10 to 40 percent of the mapped area. The soil survey rates the Secca-Rock outcrop complex soil class as having severe (2-50 percent slopes) erosion hazard potential.

Based on subsurface investigations by Engeo (2007) and Vector (1993, 1990), tailings depths are typically less than five feet bgs. Tailings depths range up to approximately 12 feet bgs in the northeastern corner of the eastern tailings pond (near Centennial Drive) and up to approximately 20 feet bgs on the northern edge of the western tailings pond. Engeo described the tailings as silt and sand with occasional gravel and clay. Bedrock underlying the tailings was typically described as weathered gabbro and diabase. In general, the gabbro was weak and highly weathered while the diabase was generally strong and moderately weathered.

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<sup>3</sup> NV5. *Idaho-Maryland Mine Project – Centennial Industrial Site: Management Plan for Steep Slopes and High Erosion Potential*. December 21, 2020.



**Figure 4.6-1  
 Soil Types: Centennial Industrial Site**



### *High Erosion Potential*

As discussed above, the USDA NRCS soil survey maps native soil in the southern portion of the Site as having severe erosion hazard potential. According to the survey, a rating of "severe" indicates that erosion is very likely in the case of soil disturbance without erosion control. For these areas, the survey advises that erosion control measures are appropriate, including revegetation of bare areas.

Although an erosion hazard potential is not listed by the NRCS, the mine tailings are predominantly sand and silt created by crushing rock, and therefore are considered to have a high erosion potential.

### Brunswick Industrial Site

According to the Web Soil Survey (USDA NRCS),<sup>4</sup> the soil survey maps four soil types at the Brunswick Industrial Site location as described below and shown in Figure 4.6-2.

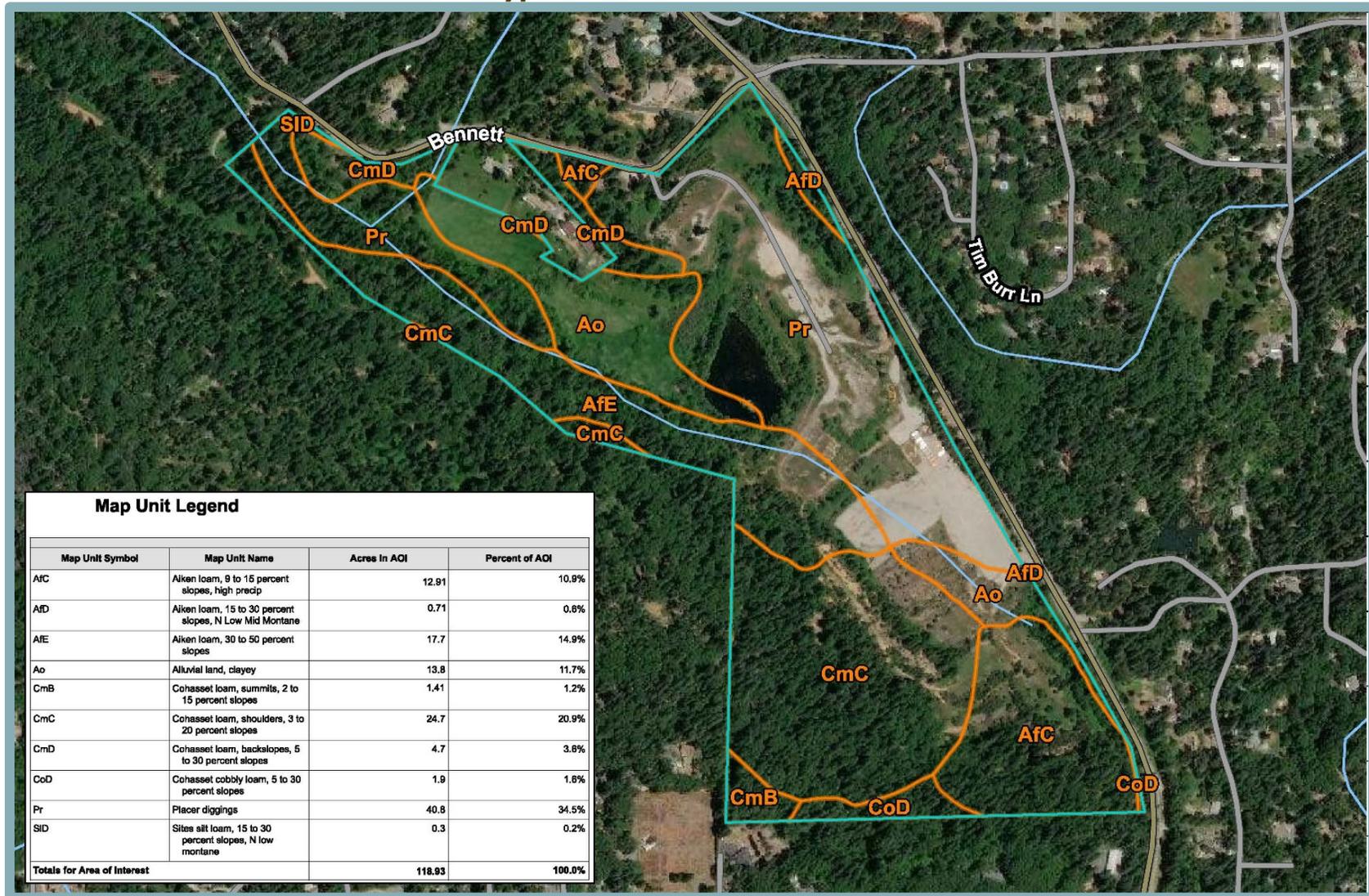
1. The central-southwest and southeast portions of the Site and small isolated areas along Brunswick Road are mapped as Aiken loam. The soil survey describes the Aiken Loam as a well-drained soil that forms on the sides of andesitic flows. According to the survey, permeability of the Aiken Loam soil type is moderately slow, and weathered andesite is commonly encountered at about 64 inches bgs. The soil survey rates the Aiken Loam soil class as having moderate (9-15 percent slopes) to severe (15-50 percent slopes) erosion hazard potential.
2. The northern and southwest portions of the Site are mapped as Cohasset loam. The Cohasset series is described as well-drained soil that forms on the sides of andesitic flows. According to the survey, permeability of the Aiken Loam soil type is moderately slow, and weathered andesite is commonly encountered at about 96 inches bgs. The soil survey rates the Cohasset loam soil class as having slight (2-15 percent slopes) to moderate (3-50 percent slopes) erosion hazard potential.
3. Most of the central portion of the Site is mapped as Placer Diggings, which is described by the soil survey as "hydraulically-mined areas, placer-mined areas along stream channels, and areas of natural deposits along the stream channels." The portions of the Site location incorrectly mapped as Placer Diggings by the soil survey are actually the result of historical hardrock mining and lumber milling activities. Although these areas were historically disturbed and subject to erosion, they are presently vegetated or covered by pavement, and therefore are not considered to have a high erosion potential. The soil survey does not rate the Placer Diggings soil class for erosion hazard potential in off-road and off-trail areas.
4. The central-northwest and central-southeast portions of the Site are mapped as clayey alluvial land, which is described by the soil survey as a miscellaneous land type consisting of narrow areas of alluvial deposits. These soils are moderately well drained to poorly drained and permeability is moderately slow to very slow. The soil survey does not rate the clayey alluvial land soil class for erosion hazard potential in off-road and off-trail areas.

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<sup>4</sup> NV5. *Idaho-Maryland Mine Project – Brunswick Industrial Site: Management Plan for Steep Slopes and High Erosion Potential*. December 21, 2020.



**Figure 4.6-2  
 Soil Types: Brunswick Industrial Site**



### **High Erosion Potential**

As discussed above, the USDA NRCS soil survey maps the central-southwest and southeast portions of the Site and small isolated areas along Brunswick Road as Aiken loam, which is classified as having moderate (for 9-15 percent slopes) to severe (for 15-50 percent slopes) erosion hazard potential.

According to the survey, a rating of "severe" indicates that erosion is very likely in the case of soil disturbance without erosion control. For these areas, the survey advises that erosion control measures are appropriate, including revegetation of bare areas.

Areas mapped by the NRCS as "Placer Diggings" were the result of historical hardrock mining and lumber milling activities. Although these areas were historically disturbed and subject to erosion, they are presently vegetated or covered by pavement. NV5's opinion is that these relatively flat-lying areas are not considered to have a high erosion potential.<sup>5</sup>

### **East Bennet Road ROW**

Several soil types are located underneath and adjacent to the East Bennett Road ROW. The majority of the area is comprised of Boomer loam, Boomer, Sites silt loam, and Cohasset loam. The erosion hazard for these soils, according to the Nevada County Soil Survey,<sup>6</sup> is as follows:

- Boomer loam: moderate to high
- Boomer: high
- Sites silt loam: moderate
- Cohasset: moderate to high

### **Steep Slopes**

The following section describes the slopes present on the Centennial Industrial Site and the Brunswick Industrial Site.

#### **Centennial Industrial Site**

The Centennial Industrial Site is typified by irregular rolling terrain. Elevations range from approximately 2,470 feet above mean sea level (AMSL) at Wolf Creek near the northwestern corner of the Site to approximately 2,580 feet AMSL in the southeastern corner of the Site. Steep slope gradients (30 percent or greater) are partially present in the following areas:

1. The west-facing downstream dam slope that runs along the eastern Site boundary;
2. Discontinuous portions of relic berms and ditches associated with the former mine tailings ponds; and
3. Discontinuous and infrequent portions of native slopes located in central and southern portions of the Site.

Impact discussion 4.6-2 in Section 4.6.4 of this chapter, Impacts and Mitigation Measures, includes an exhibit showing the steep slopes on the Centennial Industrial Site in relation to the

<sup>5</sup> NV5. *Idaho-Maryland Mine Project – Brunswick Industrial Site: Management Plan for Steep Slopes and High Erosion Potential* [pg. 5]. December 21, 2020.

<sup>6</sup> United States Department of Agriculture, Soil Conservation Service and Forest Service. Soil Survey of Nevada County Area, California. Available at: [https://www.nrcs.usda.gov/Internet/FSE\\_MANUSCRIPTS/california/CA619/0/nevada\\_a.pdf](https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/california/CA619/0/nevada_a.pdf). Accessed November 12, 2021.



proposed improvement areas. As will be further discussed, the majority of the current steep slope areas will be removed under the post-remediation baseline condition.

### Brunswick Industrial Site

Brunswick Industrial Site topography varies from flat to gently sloping along portions of the developed areas, to steeply sloping in the western and southern portions of the Site. Elevations range from approximately 2,900 feet AMSL in the southwest corner of the Site to approximately 2,780 feet AMSL along the northeastern boundary. Steep slope gradients (30 percent or greater) are partially present in the following areas of the Brunswick Industrial Site:

1. The Brunswick Road fill slope along the northeastern Site boundary;
2. Fill slopes associated with the historical New Brunswick mine area in the northern portion of the Site;
3. Cut and fill slopes associated with the historical lumber pond and dam in the northern portion of the Site;
4. Terraced cut slopes associated with the historical lumber decks in the central portion of the Site; and
5. Discontinuous areas of steep native slopes above and to the southwest and south of the historical lumber terraces.

Impact discussion 4.6-2 in Section 4.6.4 of this chapter, Impacts and Mitigation Measures, includes an exhibit showing the steep slopes on the Brunswick Industrial Site in relation to the proposed improvement areas.

### **Liquefaction**

Liquefaction occurs when saturated fine-grained sands and/or silts lose physical strength temporarily during earthquake induced shaking and behave as a liquid due to the loss of point-to-point grain contact and transfer of normal stress to the pore water. Liquefaction potential varies with water level, soil type, material gradation, relative density, and probable intensity and duration of ground shaking. The Geotechnical Engineering Reports concluded that the overall potential for liquefaction at both the Centennial and Brunswick Industrial Sites is remote.<sup>7</sup>

### **Expansive Soils**

Expansive soils are characterized by their ability to undergo significant volume change due to variation in moisture content. For the Centennial Industrial Site, Engeo (2007) encountered potentially expansive clay/silt layers within the mine tailings. The laboratory test results indicated that these soils exhibit low to moderate shrink/swell potential with variations in moisture content. Moderately to highly expansive soil layers were encountered in other on-site locations. Engeo characterized their explorations as having a limited amount of potentially expansive clay.<sup>8</sup>

NV5 performed expansive soil testing at the Brunswick Industrial Site (2019) and determined that the potential for expansive soil hazards to affect the proposed improvements is considered to be moderate to high. Thin lenses of expansive fine-grained near-surface soils are present at the Site.

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<sup>7</sup> NV5. *Geotechnical Engineering Report, Idaho-Maryland Mine Project – Centennial Industrial Site* [pg. 11]. December 20, 2019; NV5. *Geotechnical Engineering Report, Idaho-Maryland Mine Project – Brunswick Industrial Site* [pg. 12]. November 18, 2019.

<sup>8</sup> ENGeo Incorporated. *Geotechnical Report, Idaho-Maryland Mine, Surface Facilities and Improvements, Grass Valley, California* [pg. 12]. March 6, 2007.



## Brunswick Clay-Lined Pond Dam

The existing clay-lined pond, constructed for the sawmill circa 1988, was evaluated by NV5. NV5 advanced seven exploratory borings along the south and southwestern portion of the pond dam. Generalized descriptions of the soil units encountered during the exploratory boring investigation are described in stratigraphic succession below:

- **Upper Fill - Sandy Clay/Sandy Silt:** Yellowish brown, stiff to very stiff fill encountered in all borings from the surface of the dam embankment to approximately 7.5 to 14 feet bgs.
- **Lower Fill - Clayey Gravel with Sand:** Grayish brown clay with bluish gray rock, medium dense fill, approximately 4 to 8 feet thick, was encountered in several borings. **Well Graded Gravel with Sand:** Bluish Gray, medium dense crushed mine rock fill, approximately 2.5 to 5 feet thick, was encountered in two borings. **Organic Soil:** Black, soft to medium stiff, well preserved to partially decomposed organic fill (predominantly sawdust with some bark), approximately 1 to 4 feet thick, was encountered in multiple borings.
- **Bottom of Fill – Silt with Sand/Sandy Clay:** Mottled dark brown or olive gray, soft to medium stiff to medium dense fill, approximately 1 to 3 feet thick, were encountered in several borings.
- **Native Floodplain Deposits – Silt:** Very dark grayish brown to mottled dark brown, soft to very stiff native soil below fill at least 2 to 4 feet thick, was encountered in several borings.
- **Native Residual Soil – Clay with Sand:** Reddish brown, medium stiff to stiff residual soil below fill at least 1 to 2 feet thick, was encountered in two borings.

The on-site exploratory dam borings and an interview with an equipment operator previously involved with construction of the dam, confirm that a layer of organic fill (sawdust) is present within the southwestern-most 200-foot segment of the dam. Boring logs indicate that the sawdust layer is up to 4 feet thick at the dam centerline, at a depth of approximately 12 to 18 feet bgs. Based on the original topography of the dam footprint, it is likely that the organic layer thickness decreases towards the inboard section of the pond and increases towards the downslope face of the dam.

## Near Surface Features that Could Become Unstable

NV5 performed an assessment of the potential for surface impacts at the locations of known near-surface mine features resulting from dewatering of the underground mine workings as part of proposed project's underground mining operations.<sup>9</sup>

The Idaho-Maryland Mine was first located as the Eureka claim in 1851, targeting a gently easterly-raking ore shoot located on the eastern side of Grass Valley. In 1915, the Eureka, Idaho and Maryland claims were assembled under Errol MacBoyle and reopened. MacBoyle consolidated the Brunswick and Morehouse mines into the Idaho Maryland group in 1926. The mine was forced to close at the onset of World War II but reopened after the war and continued operations until final closure in 1957.

Subsequent land use in the area shifted toward urban development and land holdings were subdivided and rezoned for commercial, light industrial and residential use. Over this period, some near-surface mining excavations were closed, filled, or obscured by earthwork grading and

<sup>9</sup> NV5. *Idaho-Maryland Mine Project: Geotechnical Assessment of Near Surface Mine Features*. Revised September 11, 2020.



development. NV5 performed record searches and located as-built documentation or records of closure for some of the near-surface features. Other features were historically closed without engineering design or agency oversight.

The current water elevation in the mine is approximately 2,500 feet AMSL and currently drains by gravity from the East Eureka Shaft. In order to recommence mining, the underground mine must be dewatered, and groundwater entering the mine must be continuously pumped during the mining operation. Approximately 2,500 acre-feet (approximately 815 million gallons) of water are expected to be pumped from the underground workings during the initial 6-month dewatering period (EMKO, 2020), lowering the water level in the mine approximately 3,200 feet from the current water elevation in the mine of 2,497 feet AMSL. When the water level in the mine workings is located near the ground surface, the drawdown of groundwater within the mine workings may increase the potential for settlement or collapse of shallow workings that were not formally closed. Near surface workings that are already in a dewatered state would generally not be significantly impacted by dewatering the mine.

NV5's assessment focuses on specific near-surface mine features because they are generally more susceptible to subsidence and collapse than are deeper mine workings. The near-surface features may be located in weaker materials (soil and weathered rock); whereas the deeper mine workings are commonly located in competent bedrock. In addition, the underground mine workings focused on removal of quartz vein materials that are generally narrow, so the collapse of a deep (e.g., 100 feet bgs) mine feature is not likely to be expressed at the ground surface.

Of the near-surface features evaluated by NV5, several were recommended for closure where the static groundwater surface is located within 100 feet of the ground surface. These features are discussed below and the locations of these features are shown in Figure 3-14 of the Project Description chapter. In their peer review of NV5's report, ECM notes that, as a margin of safety, NV5 has chosen a separation between the groundwater surface and the ground surface of 100 feet. They believe that in all areas where the separation equals or exceeds 100 feet there is no chance that ground water drawdown could affect surface structures. This water table/ground surface separation distance clearly divides the northern mines from the southern mines. The northern mine openings all have a separation of less than 100 feet, and NV5 recommends potential remediation (i.e., closure) for all of them. For the southern mines, where the separation is greater than 100 feet, they recommend no further actions. ECM is in agreement with NV5 and based on their conclusions and based on the known physical characteristics of the rock units, considers this distance to be conservative.<sup>10</sup>

### East Eureka Shaft

The East Eureka Shaft is located at 815 Idaho Maryland Road beneath a commercial office building occupied by Navo and Sons. Access to the feature is limited by the existing building. Below the building, the feature is suspected to be open and supported with a concrete collar. A small steel pipe passes through the east side of the building from a sump adjacent to the feature (EMKO, 2020).

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<sup>10</sup> ECM. *Applicant Report Peer Review, Idaho Maryland Mine: Centennial and Brunswick Sites* [pg. 34]. August 13, 2020.



### East Eureka Drain

The East Eureka Drain includes an approximately 24-inch diameter culvert that extends approximately 70 feet to the southwest from the East Eureka Shaft through a gravel parking lot. The drain discharges to Wolf Creek.

### Idaho Drain Tunnel

The Idaho Drain Tunnel is located at 865 Idaho Maryland Road, and appears to be a horizontal excavation that was covered by previous earthwork grading. Minor seepage was observed emanating from bottom of the fill into Wolf Creek in February 2020. Water level in the mine workings is likely present near the elevation of the drain portal, which is lower than the current ground surface elevation as a result of the fill placed over the area. Based on information provided by a neighboring property owner, the boulders and fill were placed in the tunnel portal approximately 15 years ago. Closure documentation is not available.

### Idaho Pump Shaft

The Idaho Pump Shaft is located in an industrial yard at 865 Idaho Maryland Road. Previous earthwork grading to construct the industrial yard resulted in the placement of fill over the Idaho Pump Shaft. The property owner indicated that the settlement at the ground surface was observed approximately 5 years ago at a location approximately 100 feet south of the mapped location of the Idaho Pump Shaft. The settlement was subsequently backfilled. Closure documentation is not available for the Idaho Pump Shaft or the nearby settlement feature. Water level in the mine workings is expected at approximately 27 feet bgs.

### Idaho Shaft

The Idaho Shaft is a larger diameter incline shaft extending from the ground surface to 2,000 feet bgs. The shaft is located immediately south of a large concrete ore bin that remains from the historical mining operations. The ore bin was observed to be tilting to the south, presumably as a result of settlement around the Idaho Shaft collar, which is reportedly covered by a concrete cap and soil/rock fill.

The property owner indicated that approximately two years ago settlement of the ground surface was observed near the shaft location and was backfilled with boulders and soil. Documentation is not available. Additional settlement at the shaft location, measuring approximately four feet by five feet wide and 18 inches deep, was observed in February 2020.

### Summary

Physical closure is recommended at the East Eureka Shaft, East Eureka Drain, Idaho Drain Tunnel, Idaho Pump Shaft, and Idaho Shaft, which are currently open or partially-closed. The closure activities are discussed in Section 4.6.4, Impacts and Mitigation Measures, of this chapter.

Based on NOP comments, NV5 also performed a supplemental investigation of a potential sinking airshaft at 14035 Diamond Court. After reviewing extensive documentation regarding historical mine workings, NV5 determined that the documentation did not suggest that mine features associated with the proposed mining project are located at 14035 Diamond Court.<sup>11</sup> Although NV5 cannot rule out the possibility of deep mining excavation at 14035 Diamond Court, all reviewed documents and maps of the Idaho-Maryland Mine do not provide evidence of such a feature associated with the Idaho-Maryland Mine workings. NV5 understands that air ventilation typically

<sup>11</sup> NV5. *Idaho-Maryland Mine Project: Supplemental Geotechnical Information* [pg. 3]. November 6, 2020.



followed the vein in the Idaho-Maryland Mine workings rather than extending vertically to the ground surface, and no vertical air shafts are depicted on the maps that NV5 reviewed. Historical near-surface prospecting or mining was documented in the vicinity of 14035 Diamond Court, but these features are not associated with the Idaho-Maryland Mine workings. In general, surface expressions of mining features may present physical hazards and/or unsuitable geotechnical conditions and should be assessed by a qualified professional engineer or geologist. Mine features are typically physically closed under the oversight of a licensed geotechnical engineer pursuant to a permit from the local building department.

## Mineral Resources

Areas subject to Mineral Land Classification studies are divided by the state Geologist into various Mineral Resource Zone (MRZ) categories that reflect varying degrees of mineral potential. The majority of the proposed mining areas are located within MRZ 2, with some outlying areas located within MRZ 3. According to the State, MRZ 2 are those “Areas of Identified Mineral Resource Significance.” MRZ 2 is divided into two subcategories; the relevant category for the project area is -2b.

As defined by the State, MRZ-2b are areas underlain by mineral deposits where geologic information indicates that significant inferred resources are present. Areas classified MRZ-2b contain discovered mineral deposits that are either inferred reserves as determined by limited sample analysis, exposure, and past mining history or are deposits that presently are sub-economic. Further exploration work and/or changes in technology or economics could result in upgrading areas classified MRZ-2b to MRZ-2a.

According to Nevada County Land Use and Development Code (LUDC), Section L-II 4.3.11, *Significant Mineral Areas* are “Areas where information indicates that significant mineral deposits are likely present based on State Division of Mines and Geology’s Nevada County Mineral Classification Report Maps, referred to as Mineral Resource Zones - 2 (MRZ-2).”

According to the State, MRZ 3 are those “Areas of Undetermined Mineral Resource Significance.” MRZ 3 is divided into two subcategories; the relevant category for the project area is -3a.

As defined by the State, MRZ-3a are areas containing known mineral occurrences of undetermined mineral resource significance. Further exploration work within these areas could result in the reclassification of specific localities into MRZ-2a or MRZ-2b categories. As shown on the California Mineral Land Classification Diagram, MRZ-3 is divided on the basis of knowledge of economic characteristics of the resources.

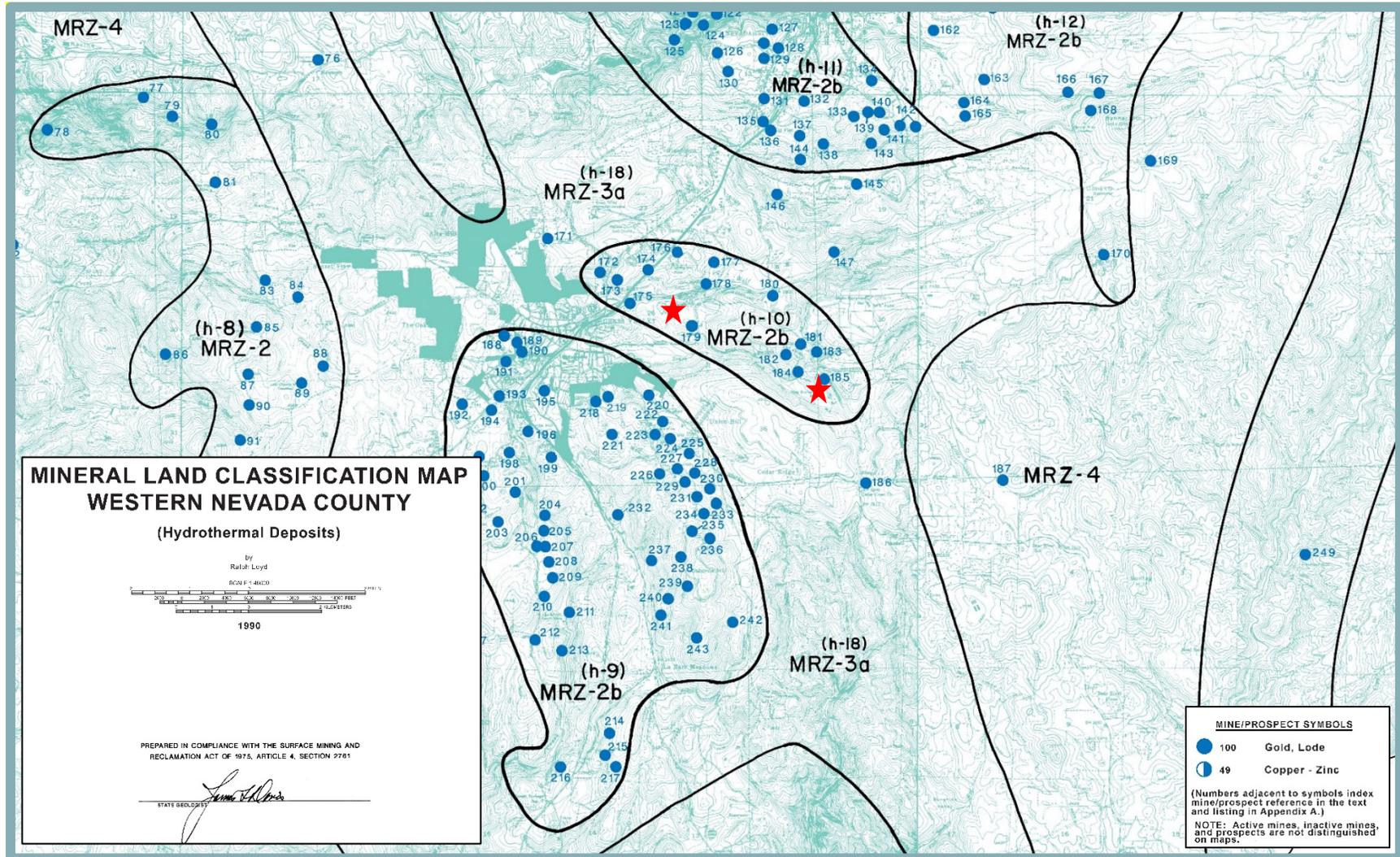
The *Mineral Land Classification of Nevada County, California*<sup>12</sup> identifies the mineral deposits in the project area as superscript ‘h’ for deposits formed by hydrothermal processes. The majority of the proposed mining areas are within MRZ-2b and have an accompanying superscript reference number of 10, which is used to identify and reference specific MRZ areas discussed in the report and displayed on the maps. For example, the Grass Valley Northeast Area is identified as MRZ-2b<sup>(h-10)</sup> – the tenth area described in the text for deposits formed by hydrothermal processes. MRZ-2b<sup>(h-10)</sup> is described as follows (and shown in Figure 4.6-3):

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<sup>12</sup> California Department of Conservation, Division of Mines and Geology (Ralph Loyd and John Clinkenbeard). *Mineral Land Classification of Nevada County, California. Special Report 164.* 1990.



**Figure 4.6-3  
 Mineral Resource Zones**



★ = Approximate project site locations



Grass Valley Northeast Area (lode gold): This area encompasses a complex system of cavity-filling quartz veins that occupy a network of faults and fissures situated between the Grass Valley and Weimar fault zones (Plate 1a). Historic mines in this area include the Idaho - Maryland mines (Locality Nos. 178 and 179, Plate 3a). Although many veins have been mined to great depth, significant amounts of gold are likely to exist at yet deeper levels. Also, significant gold resources are likely to exist along some sections of the vein system which were previously uneconomic or never explored. The geology, ore deposits, selected mines and the mining history of the Grass Valley district have been best described in detail by Johnston (1940) and summarized in Clark (1970).

A few outlying areas within the mineral rights boundary, which are proposed for mining, are designated MRZ-3a, specifically as MRZ-3a<sup>(h-18)</sup> in Special Report 164, as follows:

MRZ-3a<sup>(h-18)</sup> - Wolf Creek/Grass Valley Faults (lode gold): Cavity-filling, locally gold-bearing quartz veins occupy fractured and sheared rock along the strikes of the ancient Wolf Creek and Grass Valley faults. Some veins have yielded significant amounts of gold in past years. The Stockton Hill, Belle of France, and the Empress mines (Locality Nos. 101, 97, and 76, Plate 3a) are several of the notable gold mines located within this structural zone.

## **Paleontological Resources**

As previously discussed, the Centennial and Brunswick Industrial Sites are located within a region underlain by a complex assemblage of igneous and metamorphic rocks in the western foothills of the Sierra Nevada. Fossils are unlikely to survive the heat and pressure involved in the formation of igneous and metamorphic rocks. The paleontology records of the University of California Museum of Paleontology do not contain any recorded occurrences of fossils in or near the project area.<sup>13</sup>

### **4.6.3 REGULATORY CONTEXT**

The following section is a brief summary of the regulatory context under which soils, geology, seismic hazards, mineral resources, and paleontological resources are managed at the federal, State, and local levels.

#### **Federal Regulations**

The following are the federal environmental laws and policies relevant soils, geology, seismic hazards, mineral, and paleontological resources.

#### **Federal Earthquake Hazards Reduction Act**

Passed by Congress in 1977, the Federal Earthquake Hazards Reduction Act is intended to reduce the risks to life and property from future earthquakes. The Act established the National Earthquake Hazards Reduction Program (NEHRP). The goals of NEHRP are to educate and improve the knowledge base for predicting seismic hazards, improve land use practices and building codes, and to reduce earthquake hazards through improved design and construction techniques.

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<sup>13</sup> Personal communication between Patricia A. Holroyd, Ph.D., Senior Museum Scientist, Museum of Paleontology, University of California Berkeley, and Nick Pappani, Vice President, Raney Planning and Management, Inc., January 5, 2021.



## **Uniform Building Code**

The Uniform Building Code (UBC) was first published in 1927 by the International Council of Building Officials and is intended to promote public safety and provide standardized requirements for safe construction. The UBC was replaced in 2000 by the new International Building Code (IBC), published by the International Code Council (ICC), which is a merger of the International Council of Building Officials' UBC, Building Officials and Code Administrators International's National Building Code, and the Southern Building Code Congress International's Standard Building Code. The intention of the IBC is to provide more consistent standards for safe construction and eliminate any differences between the three preceding codes. All State building standard codes are based on the federal building codes.

## **State Regulations**

The following are the State environmental laws and policies relevant to soils, geology, seismic hazards, mineral resources, and paleontological resources.

### **Alquist-Priolo Earthquake Fault Zoning Act**

The 1972 Alquist-Priolo Earthquake Fault Zone Act was passed to prevent the new development of buildings and structures for human occupancy on the surface of active faults. The Act is directed at the hazards of surface fault rupture and does not address other forms of earthquake hazards. The locations of active faults are established into fault zones by the Alquist-Priolo Zone Act. Local agencies regulate any new developments within the appropriate zones in their jurisdiction.

The Alquist-Priolo Zone Act regulates development near active faults so as to mitigate the hazard of surface fault rupture. The Alquist-Priolo Zone Act requires that the State Geologist (Chief of the CDMG) delineate "special study zones" along known active faults in California. Cities and counties affected by the special study zones must regulate certain development projects within the special study zones. The Alquist-Priolo Zone Act prohibits the development of structures for human occupancy across the traces of active faults. According to the Alquist-Priolo Zone Act, active faults have experienced surface displacement during the last 11,000 years. Potentially active faults are those that show evidence of surface displacement during the last 1.6 million years. A fault may be presumed to be inactive based on satisfactory geologic evidence; however, the evidence necessary to prove inactivity sometimes is difficult to obtain and may not exist.

### **Seismic Hazards Mapping Act**

The California Seismic Hazards Mapping Act of 1990 (California Public Resources Code [PRC] Section 1690-2699.6) addresses non-surface rupture earthquake hazards, including liquefaction, induced landslides, and subsidence. A mapping program is also established by this Act, which identifies areas within California that have the potential to be affected by such non-surface rupture hazards. The Seismic Hazards Mapping Act specifies that the lead agency for a project may withhold development permits until geologic or soils investigations are conducted for specific sites and mitigation measures are incorporated into plans to reduce hazards associated with seismicity and unstable soils.

### **California Building Standards Code**

The State of California regulates development within the State through a variety of tools that reduce or mitigate potential hazards from earthquakes or other geologic hazards. The 2016 California Building Standards Code (CBSC) (California Code of Regulations [CCR], Title 24) governs the design and construction of all building occupancies and associated facilities and equipment throughout California. In addition, the CBSC governs development in potentially



seismically active areas and contains provisions to safeguard against major structural failures or loss of life caused by earthquakes or other geologic hazards. The CBSC includes federal building standards in the national building code, building standards adapted from national codes to meet California conditions, and building standards adopted to address particular California concerns.

### **Surface Mining and Reclamation Act**

The Surface Mining and Reclamation Act (SMARA) was enacted by the State in 1975, through Public Resources Code Sections 2710-2796, as a means of minimizing adverse environmental effects of surface mining, ensuring that mined lands are reclaimed to a usable condition and that the production and conservation of mineral resources are encouraged. The act establishes state policy regarding reclamation of mined lands and minerals management practices, among other things.

### **Public Resources Code Section 5097.5**

Section 5097.5 of the PRC establishes protections for historic, prehistoric, archaeological, and paleontological features. In particular, Section 5097.5 prohibits the intentional excavation, removal, destruction, injury, or defacement of historic or prehistoric ruins, burial grounds, and archaeological or vertebrate paleontological sites on public lands. Public lands are defined as those lands owned by, or under the jurisdiction of, the state, or any city, county, district, authority, public corporation, or any agency thereof.

### **Local Regulations**

Relevant goals and policies from the Nevada County General Plan and various other local guidelines and regulations related to soils, geology, seismic hazards, mineral resources, and paleontological resources are discussed below.

### **Nevada County General Plan**

The following goals and policies from the Nevada County General Plan are applicable to the proposed project:

#### **Safety Element**

Goal GH-10.2 Minimize injury and property damage due to geologic and seismic hazards.

- |                  |  |
|------------------|--|
| Policy GH-10.2.1 | Ensure that new construction meets current structural and safety standards.  |
| Policy GH-10.2.2 | Continue to cooperate with the State Department of Conservation – California Geological Survey, the State Office of Emergency Services and other appropriate Federal, State and local agencies and incorporate the most current data concerning the following as the basis for the County’s Site Development Standards, and project site plan review: <ul style="list-style-type: none"><li>a. Geologic hazards; and</li><li>b. Seismic hazard data for sensitive land uses such as schools, medical facilities, high-density residential uses, and intensive commercial uses.</li></ul> |



As part of the project site review process, require sufficient soils and geologic investigations to identify and evaluate the various geologic and seismic hazards that may exist for all proposed development, including subdivisions. Such investigations shall be required within an area determined to be seismically active by the State Department of Conservation – California Geological Survey, or within an area having potential geologic hazards, including slope instability and excessive erosion.

Goal SF-10.6 Ensure adequate public safety services and facilities through development standards, development fees, and land use patterns.

Policy SF-10.6.3 Land use patterns and development standards shall minimize hazards resulting from wildfire, flooding, earthquake, slope failure, avalanche, and other natural occurrences.

### Soils Element

Goal 12.1 Minimize adverse impacts of grading activities, loss of soils and soil productivity.

Policy 12.1 Enforce Grading Ordinance provisions for erosion control on all new development projects by adopting provisions for ongoing monitoring of project grading. Project site inspection shall be required prior to initial site disturbance and grading to ensure all necessary control measures, including proper staking and tree protection measures, are in place. The installation, maintenance, and performance of erosion and sedimentation control measures shall be monitored by County or District staff (or their designee) and completely funded by a project applicant. All County projects shall comply with this policy.

Policy 12.2 Enforce Grading Ordinance requirements for grading or vegetation removal not associated with a development project. Exempted from this requirement are actions necessary for evaluation of soils and other environmental characteristics, and for control of fire fuels, and for agricultural and timber production.

Policy 12.3 Cooperate and encourage those activities dealing with techniques and practices to minimize erosion in cooperation with Nevada County Resource Conservation District, including provision of educational materials for the general public regarding techniques and practices to minimize erosion from construction activities.



Policy 12.4 Require erosion control measures as an element of all County contracts, discretionary projects, and ministerial projects.

### Mineral Management

Goal 17.1 Recognize and protect valuable mineral resources for current and future generations in a manner that does not create land use conflicts.

Policy 17.2 Exploration is conditionally permitted in compatible General Plan designations. A conditional use permit shall be required if:

- a. Overburden or mineral deposits in excess of 1,000 cubic yards are disturbed; or
- b. The operation in any one location exceeds one acre in size; or
- c. De-watering will occur or water will be discharged from the site as a result of the operation.

Exploration is conditionally permitted in incompatible General Plan designations providing:

- a. Methods of geological survey, geophysical, or geochemical prospecting are used; or
- b. Bore holes and trial pits not exceeding 100 cubic yards of overburden or other mineral disturbance per acre may be done.
- c. No explosives may be used other than geophysical; there may be no drifting or tunneling and de-watering or water discharge is not allowed.

Policy 17.3 All exploratory operations shall require a reclamation plan unless:

- a. Less than 1,000 cubic yards of overburden are disturbed; and
- b. The size of the operation in any one location is one acre or less.

In those instances where a reclamation plan is not required, an erosion control plan, approved by the Nevada County Planning Department, and a grading permit shall be required for those operations in which 50 cubic yards or more of overburden are disturbed.

Policy 17.4 All operations shall comply with the Nevada County General Plan Noise Chapter standards.



- Policy 17.5 Nevada County hereby recognizes, accepts, and adopts by reference those State Classification Reports as found in Appendix A of Ch. 17: Mineral Management providing information on the location of significant mineral deposits within the County.
- The General Plan land use map shall include a Significant Mineral Deposit identification reflecting MRZ-2 areas as determined in the Reports and similar studies. At any time a Classification Report is presented to the County, said map shall be amended to reflect the Report within 12 months. When it is necessary, due to the lack of specificity, to clarify the exact location of this identification, said Reports shall be used.
- Policy 17.6 Encourage extraction of mineral resources in compatible areas prior to intensified urbanization or conversion to other incompatible land use development.
- Policy 17.7 Use permit time limits for each project shall be established on a case-by-case basis. Time limits shall be based on the reasonably expected life of the mining operation and potential conflicts with future neighboring land uses. Each project shall have a periodic review for compliance with the use permit by the Planning Agency. In no case shall such review time period exceed five years. Said review shall be funded by the applicant.
- Policy 17.8 A reclamation plan, consistent with the State Surface Mining and Reclamation Act standards, is required for all mining operations. Reclamation shall:
- a. Prevent, mitigate, or minimize adverse effects on the environment; and
  - b. Encourage the production and conservation of minerals; and
  - c. Provide for the protection and subsequent beneficial use of mined and reclaimed land; and
  - d. Eliminate residual hazards to the public health and safety; and
  - e. Ensure that mined lands are reclaimed on a timely basis to a usable condition that is readily adaptable for alternative land uses; and
  - f. Avoid the environmental and legal problems created by improperly abandoned mines.
- Policy 17.9 Encourage the mining of previously mined land, if such land still contains economically mineable minerals, so the land can be reclaimed for alternative uses.



- Policy 17.13      The County shall require satisfactory forms of accessible security, including irrevocable letters of credit, cash deposits, escrowed negotiable securities, or performance bonds, from all mining projects to cover all such damages which may stem from the projects.
- Policy 17.14      Already existing development – commercial, residential, and community – as well as undeveloped private lands, shall be protected from adverse environmental effects caused by mining through enforced use permit conditions and mitigations measures, or denial of the projects. The County shall be the enforcement agency.
- Policy 17.24      Regardless of the General Plan designation, subsurface mining shall be conditionally permitted throughout the County. Said mining shall be allowed only after impacts on the environment and affected surface land uses have been adequately reviewed and found to be in compliance with CEQA. Of particular importance shall be the impact of the operation on surface land uses, water quantity and quality, noise and vibration, land subsidence, and traffic associated with surface access. All other related impacts shall also be addressed.
- Policy 17.25      Surface access to subsurface mining is conditionally permitted only in compatible General Plan designations as defined herein. However, vent and escape shafts are conditionally permitted in incompatible General Plan designations where surface disturbance is minimal.
- Policy 17.26      Surface plants for underground mines differ greatly in complexity and areal extent so evaluation on an individual project basis is required to assess impact on the environment. The simplest case is a mine portal or shaft collar from which ore and waste are removed from the site for treatment and disposal elsewhere. As a result, the impact on the environment could be minimal. The most complex cases involve stockpiles, crushing and grinding facilities, concentrators and other processing units, shops, warehouses and offices, waste disposal areas, tailings ponds and extended infrastructure. Such operations shall receive the same evaluation as large surface mines.

### **Nevada County Land Use and Development Code**

The Nevada County LUDC (Title 3) includes mining regulations in Article 3 and Resource Standards within Article 4 (Comprehensive Site Development Standards). These sections are summarized in the following section.



### Surface Mining Permits and Reclamation Plans

Section L-II 3.22 provides mining regulations to implement SMARA. Surface mining is allowed in the AG, FR, M1, M2, P, PD, and TPZ Districts and where the property is zoned ME, subject to approval of a Use Permit and Reclamation Plan.

All Reclamation Plans shall comply with Article 4 Site Development Standards and the provisions of SMARA (Sections 2772 and 2773) and SMARA's implementing regulations (CCR Sections 3500-3505). Reclamation activities shall be initiated at the earliest possible time on those portions of the mined lands that will not be subject to further disturbance. Interim reclamation may also be required for mined lands that have been disturbed and that may be disturbed again in future operations. Reclamation may be done on an annual basis, in stages compatible with continuing operations, or on completion of all excavation, removal, or fill, as approved by the County. Each phase of reclamation shall be specifically described in the Reclamation Plan and shall include (a) the beginning and expected ending dates for each phase; (b) all reclamation activities required; (c) standards for measuring completion of specific reclamation activities; and (d) estimated costs for completion of each phase of reclamation.

To ensure that reclamation will proceed in accordance with the approved Reclamation Plan, the County shall require as a condition of approval Security that will be released upon satisfactory performance. The applicant may pose Security in the form of a surety bond, trust fund, irrevocable letter of credit from an accredited financial institution, or other method acceptable to the County and the State Mining and Geology Board as specified in State regulations, and which the County reasonably determines are adequate to perform reclamation in accordance with the surface mining operation's approved Plan.

Surface mining operators shall forward an annual surface mining report to the State DOC and to the County Planning Department on a date established by the State DOC, upon forms furnished by the State Mining and Geology Board. New mining operations shall file an initial surface mining report and any applicable filing fees with the State DOC within 30 days of permit approval, or before commencement of operations, whichever is sooner. Any applicable fees, together with a copy of the annual inspection report, shall be forwarded to the State DOC at the time of filing the annual surface mining report.

The Planning Department shall arrange for inspection of a surface mining operation within 6 months of receipt of the Annual Report required in subsection M, to determine whether the surface mining operation is in compliance with the approved Use Permit and/or Reclamation Plan, approved financial assurances, and State regulations. In no event shall less than one inspection be conducted in any calendar year.

### Resource Standards

The primary purpose of site development resource standards is to avoid the impact of development projects on sensitive environmental resources and natural site constraints. Where avoidance is not possible, development should minimize impacts in a reasonable fashion that strikes a balance between allowing development of the project site and protecting the resource or avoiding the constraint.

According to Section L-II 4.3.3, General Provisions, Subdivision B, Standard,

The intent of these site development standards is to avoid resource impacts and natural constraints to the maximum possible. To that end, such standards will be applied successively as follows (an



applicant cannot descend to the succeeding methods until he or she has shown to the satisfaction of the County that the preceding methods are infeasible):

1. Avoiding the impact by designing or re-designing the project so that the resource or constraint is fully protected and not disturbed. Avoidance is the preferred standard unless the Planning Agency determines that implementation of this standard effectively removes the potential for the reasonable development of the parcel. Avoidance may be attained through clustering, transfer of development rights, buffering, screening, identification of building envelopes, the provision of open space, or other techniques that permanently protect the resource or avoid the constraint. Permanence shall be ensured through dedication, easements, irrevocable trusts, deed restrictions, covenants, or similar techniques running with the land. In addition, zoning techniques (i.e., "Open Space" District, setbacks, etc.) may also be used to ensure permanence. Provisions to avoid the resource or constraint shall become conditions of approval or mitigation measures of the project.
2. Minimizing the impact through preparation and implementation of a County-approved Management Plan prepared by an independent consultant approved by, or under the direction of, County staff, that limits the degree of impact to the maximum extent possible. Where the Planning Agency determines that avoidance is not acceptable or adversely affects another environmentally-sensitive resource, minimization shall be the preferred standard unless the County determines that the standard will not effectively protect the resource or avoid the constraint to an acceptable level. In such instances the County shall deny the project. Minimization may be attained through clustering, buffering, screening, identification of building envelopes, the provision of open space, or other techniques that permanently protect the resource or avoid the constraint. Permanence shall be ensured through dedication, easements, irrevocable trusts, deed restrictions, covenants, or similar techniques running with the land. In addition, zoning techniques (i.e., "Open Space" District, setbacks, etc.) may also be used to ensure permanence. Management Plan provisions to minimize impacts shall become conditions of approval or mitigation measures of the project.
3. Compensating for the impact by replacing or providing a substitute resource or environments. Compensation is appropriate where the Planning Agency determines that avoiding or minimizing the impact is not acceptable. Compensation may include the on-site or off-site provision or creation, protection, and maintenance of a resource or habitat. Management Plan provisions to compensate for impacts shall become conditions of approval of the project. Lands used as compensation for unavoidable project impacts shall be acquired through fee title or conservation easements with the express purpose of maintenance as compensation for impacts to wildlife in perpetuity. Holders of title or easements shall be restricted to mutually agreed upon agencies or private, non-profit conservation entities approved by the Planning Agency.

Realistic and effective avoidance of impacts and then minimization of impacts must first precede the use of compensatory mitigation.

Subdivision C provides additional direction on Management Plans, discussed in item 2 above. According to subdivision C,

**C. Management Plan.** Management Plans are a tool that can be used to minimize the impacts of development on environmentally sensitive environmental resources and/or constraints. Where avoidance is not a feasible alternative, a Management Plan may be prepared, consistent with the provisions of this subsection.

Management Plans proposed in conjunction with a discretionary project, such as the proposed project, shall be considered by the hearing body reviewing the project. Management Plans are required for certain types of resources. With respect to geology and soils, and related issues applicable to the Centennial and Brunswick Industrial Sites, these include Steep Slopes/High



Erosion Potential (Section L-II 4.3.3(A)(j)) and Earthquake Faults and Seismically Sensitive Areas (Section L-II 4.3.3(A)(e)).

Two Management Plans have been prepared to address steep slopes/high erosion potential on the Centennial and Brunswick Industrial Sites and minimization of project impacts to these constraints. One additional Management Plan has been prepared for the Brunswick Industrial Site to address earthquake faults. These plans are discussed in the sections below.

### *Management Plans for Steep Slopes and High Erosion Potential (Centennial and Brunswick Industrial Sites, 2020)*

Management Plans for Steep Slopes and High Erosion Potential for the Centennial and Brunswick Industrial Sites (2020) were prepared pursuant to Nevada County LUDC Section L-II 4.3.13 to provide a professional site-specific inventory and analysis of steep slope (slopes of 30+ percent) and high erosion potential areas<sup>14</sup> of the Sites, and to evaluate these constraints and recommend mitigation and/or managed alternatives to avoid or reduce the impacts. The inventory and analyses are performed for the entire Sites, including all areas of proposed disturbance.

### *Brunswick Management Plan for Potential Seismic Hazards (2020)*

A Brunswick Management Plan for Potential Seismic Hazards (2020) was prepared pursuant to Nevada County LUDC Section L-II 4.3.8 to address potential seismic hazards associated with a previously-identified fault alignment. Section L-II 4.3.8.C requires a management plan for development projects that will result in disturbance within seismically active areas, which are defined in Section L-II 4.3.8.B as areas determined to be within a seismic hazard zone or to have the potential to suffer ground rupture from active faults by the State Division of Mines and Geology.

## **County of Nevada On-Site Wastewater Treatment Systems and Local Area Management Plan**

The County's On-Site Wastewater Treatment Systems (OWTS) and Local Area Management Plan (LAMP) make up the County's on-site septic disposal regulations. The OWTS and LAMP is intended to protect the public health through establishment of minimum standards for design, construction, installation, operation, maintenance, replacement, alteration, enlargement, repair, and abandonment of facilities for disposal of sewage within the unincorporated area of Nevada County. With respect to design, LAMP Section T-054 provides Special Design System Requirements; Section T-058 provides pressurized distribution system requirements; and Section T-091 provides requirements for large systems with a projected daily sewage flow between 2,500 - 10,000 gallons. Section A-026 establishes a program of monitoring, operation, and maintenance of the system.

## **4.6.4 IMPACTS AND MITIGATION MEASURES**

This section describes the standards of significance and methodology used to analyze and determine the proposed project's potential impacts related to geology, soils, mineral resources, and paleontological resources. In addition, a discussion of the project's impacts, as well as mitigation measures where necessary, is also presented.

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<sup>14</sup> Pursuant to Section L-II 4.3.13(B)(2), these are "Areas determined to have highly-erodible soils based on soils surveys prepared by the U.S. Soil Conservation Service and U.S. Forest Service."



## **Standards of Significance**

Consistent with Appendix G of the CEQA Guidelines, a significant impact would occur if the proposed project would result in any of the following:

- Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:
  - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area based on other substantial evidence of a known fault;
  - Strong seismic ground shaking;
  - Seismic-related ground failure, including liquefaction;
  - Landslides;
- Result in substantial soil erosion or the loss of topsoil;
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse;
- Be located on expansive soil, as defined in Table 18-1B of the UBC (1994), creating substantial direct or indirect risks to life or property;
- Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water;
- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature;
- Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state; and/or
- Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan.

## **Method of Analysis**

The analyses of geologic and soils constraints at the Centennial and Brunswick Industrial Sites were performed by NV5 under contract with the project applicant. ECM was retained by the County's environmental consultant for the project, Raney, to perform an independent third-party review of the work performed by NV5. The methodology employed by both geotechnical and mining experts is summarized in this section.

## **Geotechnical Engineering Reports**

For both the Centennial and Brunswick Industrial Sites, NV5 performed a review of geologic literature pertaining to the Sites, including previous site investigations (e.g., Holdrege and Kull (1997, 2004), Vector Engineering, Inc. (1989)), after which NV5 performed field investigations (2019). As part of the Brunswick Industrial Site field investigation effort, NV5 excavated exploratory trenches across the Sites, and advanced seven exploratory borings along the south and southwestern portion of the pond dam. The trenches were excavated to depths ranging from two to nine feet below the ground surface. NV5 performed laboratory tests on selected soil samples taken from the subsurface exploratory trenches and borings (Brunswick) to determine their geotechnical engineering material properties. These engineering material properties were used to develop geotechnical engineering design recommendations for earthwork and structural improvements.



Exploratory borings and excavations were not performed by NV5 for the Centennial Industrial Site due to the fact that several previous investigations have already been performed, which included subsurface investigation. These include Engeo (2007) and Vector (1990, 1993).

### **Management Plans for Steep Slopes and High Erosion Potential (Centennial and Brunswick Industrial Sites, 2020)**

NV5 prepared the Management Plans for Steep Slopes and High Erosion Potential for both the Centennial and Brunswick Industrial Sites in accordance with Nevada County LUDC Section L-II 4.3.8. As part of the effort, NV5 reviewed the Web Soil Survey (USDA, NRCS) to identify on-site soil types, and in particular, highly-erodible soils. Areas of steep slopes (>30 percent) were also identified based on grading plan information for the proposed project provided by Nevada City Engineering, Inc. Upon identification of steep slopes and highly erodible soils, NV5 identified mitigation measures for incorporation into project plans and specifications to ensure feasibility of project development.

### **Brunswick Management Plan for Potential Seismic Hazards (2020)**

NV5 prepared this management plan for the Brunswick Industrial Site pursuant to Nevada County LUDC Section L-II 4.3.8 to address potential seismic hazards associated with a previously-identified fault alignment. This management plan included a detailed review of published geologic literature pertaining to the Brunswick Industrial Site and the findings of NV5's geotechnical engineering report for Brunswick. Among the published geologic literature reviewed include but are not limited to the Geologic Map of the Chico Quadrangle, California (California DOC, Division of Mines and Geology, 1992; 1:250,000); the Geologic Map of the Grass Valley – Colfax Area (A. Tuminas, 1983); the Fault Activity Map of California (2010) prepared by the California DOC, California Geological Survey, etc.

After reviewing published geologic literature, NV5 concluded that the Brunswick Industrial Site is not located within an Alquist-Priolo active fault.

### **Geotechnical Assessment of Near Surface Mine Features**

This assessment focuses on specific near-surface mine features because they are generally more susceptible to subsidence and collapse than are deeper mine workings. Rise's acquisition of the Idaho-Maryland Mine Property included a significant collection of historic records of the Idaho-Maryland Mine, such as reports, production records and data, financial statements, development reports, survey data, exploration drill results, maps showing mine workings, geological information, and assay results. The historical records have been compiled by Rise, reviewed by Amec Foster Wheeler (Amec, 2017) and were used by Rise to locate near surface mine workings.

This assessment included NV5's review of surface conditions and existing improvements at several near-surface mine features, as well as available information of the previously developed underground workings in the project area.

As a margin of safety, NV5's analysis assumed a separation between the groundwater surface and the ground surface of 100 feet, based on the professional opinion that in all areas where the separation equals or exceeds 100 feet there is no chance that ground water drawdown could affect surface structures. ECM's peer review (discussed below) is in agreement with NV5 and considers this distance to be conservative.



## **Independent Peer Review**

ECM was retained by Raney (the County's EIR consultant) to perform an independent third-party peer review of the geotechnical documents prepared by NV5. The peer review as performed by Art Braun (Mining Geotechnical Engineer), with over 30 years of professional experience, and Donald Stevens (California Licensed Professional Engineer).

In general, ECM reviewed the following NV5's reports and independently reviewed their source materials, as determined necessary.

- Geotechnical Engineering Report, Idaho-Maryland Mine Project, Brunswick Site, NV5 Report dated November 18, 2019.
- Geotechnical Engineering Report, Idaho-Maryland Mine Project, Centennial Industrial Site, NV5 Report dated December 10, 2019.
- Brunswick Management Plan for Potential Seismic Hazards (2020).
- Management Plan for Steep Slopes and High Erosion Potential (Centennial Industrial Site, 2020).
- Management Plan for Steep Slopes and High Erosion Potential (Brunswick Industrial Site, 2020).
- Geotechnical Assessment of the Near Surface Mine Features, NV5, Report dated June 2020.

ECM's peer review did not identify any deficiencies in NV5's reports. Recommendations for further study were related to the Geotechnical Assessment of Near Surface Mine Features report. ECM recommended investigation regarding the Maslin Shaft and the 70-Level Stope. In response to these recommendations, NV5 provided Supplemental Geotechnical Information (November 6, 2020), which determined that, based on available information, these two features do not pose significant risk to future mining operations.

## **Project-Specific Impacts and Mitigation Measures**

The following discussion of impacts is based on implementation of the proposed project in comparison with the standards of significance identified above.

### **4.6-1 Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, strong seismic ground shaking, seismic-related ground failure, including liquefaction, and landslides. Based on the analysis below, and with implementation of mitigation, the impact is *less than significant*.**

Liquefaction is addressed in Impact 4.6-3 of this chapter. Regarding rupture of a known earthquake fault, pursuant to the significance thresholds, the first criterion is whether the proposed project would directly or indirectly cause potential substantial adverse effects involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area (refer to Division of Mines and Geology Special Publication 42). The 1997 edition of CGS Special Publication 42, Fault Rupture Hazard Zones in California, describes active faults and fault zones (activity within 11,000 years), as part of the Alquist-Priolo Earthquake Fault



Zoning Act. The maps and documents all indicate the project site is not located within an (Alquist-Priolo) active fault zone.

The threshold criterion also asks whether there is “other evidence of a known fault.” As previously discussed, according to the Geologic Map of the Chico Quadrangle, California (California DOC, Division of Mines and Geology, 1992, 1:250,000), a northwest trending liniment of the Grass Valley Fault Zone is approximately located or inferred along Brunswick Road east of the Brunswick Industrial Site.

The Geologic Map of the Grass Valley - Colfax Area (A. Tuminas, 1983) presents the findings of a more detailed local study. According to this geologic map, an inferred fault trends north-northwest through the Brunswick Industrial Site property approximately along the eastern shore of the pond and passing through the northern Site boundary.

The *Brunswick Management Plan for Potential Seismic Hazards (2020)*,<sup>15</sup> includes a 1986 report by Anderson Geotechnical Consultants, Inc., which contains a one-inch equals 100 feet scale map dated January 1987 by A. W. Beeson and Associates. The Beeson map shows a dashed line labeled “fault line per Anderson Geotechnical Report”, likely referring to a report produced by Anderson in February 1986, although the original has not been located.

ECM, during its peer review of NV5’s Brunswick Management Plan for Potential Seismic Hazards (2020), reviewed the 1992 Geologic Map of the Chico Quadrangle (DOC, Saucedo and Wagner) and the Special Report 164, State Map DRG SM-164, Mineral Land Classification of Nevada County, California, California DOC Division of Mines and Geology, Scale of 1:48,000, by Loyd and Clinkenbeard, 1990 (incorporates results of Tuminas, 1983). As noted by ECM, both maps (1992 DOC Geologic Map of Chico Quadrangle, and 1990 DOC Special Report 164) depict the feature as a dashed line meaning that the fault is believed to exist, but its location is approximate.<sup>16</sup>

A Final Map for the previously proposed Bet Acres Subdivision, dated January 1987, was drawn up by A. W. Beeson and shows the location of where Anderson Geotechnical Consultants had believed a fault to be, based on their previous site investigations, and depicted it as a straight dashed line with two parallel lines located 200 feet either side, showing, presumably Anderson’s suggested setback distances for building construction. The map shows the feature to strike north north-west, and to be dominantly located in Lot 8, cutting across a portion of Lot 7. Anderson’s previous reporting stated that the fault “appears to be present on the northern part of the lot”, which ECM interprets to mean that the presence of the fault is “inferred” and its presence and location has not necessarily been proven.<sup>17</sup> ECM believes that if the feature had been mapped in any detail, and confirmed by Anderson, that it would have been depicted on the map as a solid line instead of a dashed line.

<sup>15</sup> NV5. *Idaho-Maryland Mine Project – Portion of Brunswick Industrial Site: Management Plan for Potential Seismic Hazards*. January 16, 2020.

<sup>16</sup> ECM. *Applicant Report Peer Review, Idaho Maryland Mine: Centennial and Brunswick Sites* [pg. 15]. August 13, 2020.

<sup>17</sup> *Ibid.*



As stated by ECM:

The basic definition of a fault is important for discussion. A fault is defined as a fracture on which movement has occurred. This movement might be as little as a few microns, or as large as thousands of feet as might be associated with earth scale tectonic features. Smaller displacement faults are common across the entire Earth, and can be the result of localized stress relief that occurred during the original placement of the rocks, or from other local inhomogeneities that occur during erosion, or old tectonic activity. In all of these cases, even though they might exist, they do not necessarily have to have any recent movement. A fault likely does exist somewhere in the vicinity of the three different inferred locations discussed above. The question then arises as to whether it might have been active in recent times. NV5 believes the feature formed during the Mesozoic era, at least 65 million years ago. They consider it inactive and designate it as a Type C fault zone “with a low seismicity and a low rate of occurrence”. Based on ECM’s knowledge of the geology of the area, we are in agreement with NV5’s conclusion, and no evidence has been found that suggests there might have been any recent fault movement in the general site area. In support of NV5’s and ECM’s conclusion, further review of the Chico quadrangle map shows that Saucedo and Wagner’s interpretation of the fault shows it to terminate at the north edge of mapped Tertiary volcanics (MPv), at a location a little over a half mile south of the New Brunswick Shaft. Since the map does not show the fault crossing the volcanic unit, we conclude that there has been no fault movement to break the overlying Miocene volcanic rock since its deposition in the Miocene Epoch 5 to 23 million years ago. If otherwise, the overlying Miocene volcanic unit would also be displaced, or at least fractured.

As the most recent evidence, both surface and underground miners have been working in the Grass Valley area at the various mines since the mid 1860’s provides over 150 years of observation. We have found no records that indicate that any movement has occurred on any faults at or near the site. This conclusion is also consistent with the conclusions reached by the State of California as related to Earthquake Zones, as shown on the California Earthquake Zone Database.

Based on the information that has been presented, there is likely a fault located on or near the site within 600 feet of the New Brunswick shaft. The nearby 5 to 23 million-year-old volcanics located over the inferred location of the fault show no fracturing, thus this is indicative that no movement had occurred more recently. From a modern perspective, the existing New Brunswick shaft and its various ancillary facilities have been in place for over 150 years, and have never reported any seismic damage, nor have any historic reports been found that might indicate modern seismic activity. Whether or not a fault might exist, there is no evidence that this area is now seismically active...

Based upon this substantial evidence in the record, the project includes a request to amend the Final Map for Bet Acres recorded in February 1987 in Book 7 of Subdivision Maps at Page 75 to remove the “200’ Building Setback From Fault”, as shown on Sheet 4 of Final Map #85.



In addition, a management plan was prepared pursuant to Nevada County LUDC Section L-II 4.3.8 to address potential seismic hazards associated with the previously-identified inferred fault alignment. Section L-II 4.3.8.C requires a management plan for development projects that will result in disturbance within seismically active areas, which are defined in Section L-II 4.3.8.B as areas determined to be within a seismic hazard zone or to have the potential to suffer ground rupture from active faults by the State Division of Mines and Geology. As noted therein, the inferred fault alignment identified by Anderson at the Brunswick Industrial Site is a trending liniment of the Grass Valley Fault Zone, a subset within the regional Foothills Fault System. The Foothills Fault System formed during the Mesozoic era (between approximately 65 million and 248 million years ago). The Grass Valley Fault Zone is not considered active, and the Foothills Fault System is designated as a Type C fault zone, with low seismicity and a low rate of recurrence. It is NV5's professional opinion that the subject fault, identified on the property in Map 85-7, does not qualify as a seismically active area as defined by Nevada County LUDC Section L-II 4.3.8.B, and the proposed project development within the designated building setback fault zone is generally feasible from a geotechnical engineering standpoint, provided that the recommendations presented in the project geotechnical engineering report (NV5; November 18, 2019) are incorporated into the project plans.<sup>18</sup>

While the analysis shows that an active fault likely does not exist, out of an abundance of caution, the County has concluded that a **significant** impact could occur with respect to exposing people or structures to the risk of loss, injury, or death involving rupture of an earthquake fault, strong ground shaking, ground failure, liquefaction, or landslides.

#### Mitigation Measure(s)

Implementation of the following mitigation measure would reduce the above potential impact to a *less-than-significant* level.

4.6-1 *Prior to approval of Improvement Plans, the design recommendations from the Brunswick Industrial Site Geotechnical Report (November 18, 2019) shall be incorporated into the Plans to the satisfaction of the Nevada County Building Department. Recommendations regarding slope stability and seismic criteria are set forth in Sections 5.1 and 5.2 of the Geotechnical Report, including but not limited to:*

- *Permanent cut slopes shall not be steeper than 2:1, horizontal to vertical (H:V).*
- *Fill slopes greater than 30 feet in height shall be terraced with surface drains that restrict surface runoff from travelling more than 30 feet continuously down the fill slope face. The applicant shall retain NV5 to review fill slope configurations greater than approximately 10 feet in height, prior to fill placement.*
- *Fill shall be placed in horizontal lifts to the lines and grades shown on the grading plan. Slopes shall be constructed by overbuilding the slope face and then cutting it back to the design finished grade slope gradient. Fill shall not be constructed or extended horizontally*

<sup>18</sup> NV5. *Idaho-Maryland Mine Project – Portion of Brunswick Industrial Site: Management Plan for Potential Seismic Hazards* [pg. 5]. January 16, 2020.



by placing soil on an existing slope face and/or compacted by track walking.

- Building footings shall be trenched into competent native soil, weathered rock or compacted fill, and reinforced with a minimum of two No. 4 rebar reinforcement, one near the top of the footing and one near the bottom.
- Slab-on-grade floors shall be used and designed by a structural engineer with regard to the anticipated loading. Interior building concrete slab-on-grade floor shall meet minimum concrete slab thickness, steel reinforcement, rebar, and crushed rock or aggregate base layer specifications in Section 5.2.3 of the Geotechnical Report.
- Rock anchors or doweling shall be used to provide lateral and uplift resistance where shallow, competent rock limits footing excavation. Rock anchors should only be installed in competent rock.

**4.6-2 Result in substantial soil erosion or the loss of topsoil. Based on the analysis below and with implementation of mitigation, the impact is less than significant.**

The proposed project would involve grading and construction activities at the Centennial and Brunswick Industrial Sites, as well as along East Bennett Road for installation of the potable water supply pipeline. Construction work (e.g., grading) in each of these areas would result in disturbance of more than one acre of land. Thus, compliance with the State Water Resources Control Board (SWRCB) general permit to discharge storm water associated with construction activity is required. The general permit is known as the SWRCB, Order No. 2009-0009-DWQ (as amended by Orders 2010-0014-DWQ and 2012-006-DWQ), National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002, Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction Activity (Construction General Permit). The project applicant would be required to submit a Notice of Intent (NOI) for coverage under the Construction General Permit and prepare a construction SWPPP.

The SWPPP would need to address any project-related activities that have the potential to release pollutants, including sediment, in stormwater, such as:

- Excavation work;
- Material stockpiling;
- Waste and soil screening;
- Loading and hauling of materials; and
- Winterization of incomplete activities.

Stockpiles

When areas are graded for placement of engineered fill, facilities, and infrastructure, available topsoil would be salvaged from those areas and stockpiled on-site. Before topsoil is salvaged, the area would be cleared of woody vegetation and root balls using chainsaws and a portable excavator. Plant debris will be chipped in place and spread on the topsoil. This organic matter would be blended with the topsoil during harvest.



As outlined in the Reclamation Plan, the following actions will be implemented related to topsoil stockpiles:

- Topsoil and vegetation will not be removed more than 1 year before necessary and will be kept to a minimum.
- After topsoil is stripped, it will be hauled and stored if it cannot be used at that time for concurrent reclamation activities.
- Topsoil will be stockpiled in a manner that will not obstruct natural drainage.
- The topsoil will be compacted as little as possible. If compacting of a portion of the stockpiles is necessary for stability, compacting will occur to the minimum extent necessary. Topsoil compaction will not be such that its ability to perform as a planting medium will be compromised.
- Topsoil stockpiles will be protected from sediment transport by surface roughening, watering, and perimeter silt fencing.
- Topsoil stockpile areas will be identified and well-marked.
- Relocation of topsoil after it is stockpiled will be minimized.
- If topsoil is stored during the winter rainy season, erosion control measures will be implemented.
- A small bulldozer or similar equipment will be used to rip and blend the soil materials as necessary.
- To the extent feasible, rocks and plant material in excess of 4 inches in greatest dimension should be removed from the topsoil.
- Any topsoil stockpile remaining longer than 30 days will be seeded with a sterile temporary cover or the specified erosion-control seed mixture.

### Engineered Fill Slopes

The engineered fill slopes would be 3:1 (H:V). The proposed fill material will consist of a composite of blast rock and sand tailings produced underground. The angular rock is anticipated to have good binding properties and compaction will occur by grain to grain contact, while finer grained materials will require more effort to obtain a desired level of compaction. Blending of the two materials can produce a higher density final fill given that the finer material fills in spaces between the larger fragments.

The face of the fill should be easily maintainable at a slope of 1 to 3 (rise over run) and a vegetation cover would be expected to grow well on the north and northwest facing surfaces. The fill is going to be constructed over a period of years, and while most of the surface can be maintained in a finished, or semi-finished and stable vegetated condition, during the life of the project, there will likely be areas that will be open and subject to potential erosion should a larger than expected storm occur. An important design feature shown on the grading plans are the detention ponds that are to be constructed immediately down-gradient of the fill areas. These ponds, while collecting sediments, also provide a second level of containment in the event that unanticipated erosion of an open surface occurs. Further, the design of the pond will allow any eroded material that has entered it to be recovered and reused beneficially. According to ECM's peer review, the design has been well thought out and is appropriate for the Site and project.<sup>19</sup>

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<sup>19</sup> ECM. *Applicant Report Peer Review, Idaho Maryland Mine: Centennial and Brunswick Sites* [pg. 20]. August 13, 2020.



On-site fills are proposed to be constructed at a slope ratio of 3:1. Due to the relatively mild gradient, mid-slope benches would not be required. Where slope banks are great enough in height to require mid-slope interceptor ditches, “J” Ditches will be provided. These would eliminate any likelihood of erosion occurring on the slope faces.<sup>20</sup> Additionally, the flatter 3:1 slopes would also enhance the viability of landscaping and vegetative efforts on those slopes.

The proposed detention basins at each Site are intentionally located at the downstream toe of each fill site. This would be done so that they may be constructed and made functional relatively early in the process of the fill operations. Therefore, as the fill areas rise throughout the anticipated duration of this portion of the mining operation, flows would be directed to these facilities via the drainage pipes which proceed downhill from the surface of the fill, allowing the flows to be directed to the detention basins. These pipes in the proposed 3:1 slopes, at any given point in the process of placing the fills, would be extended up slope from the detention basins to the then-current surface. Interceptor ditches and catchment sumps would be formed at the surface, as indicated on the grading plans, and would be replaced periodically as the fill operation progresses and the surface elevation rises. By this strategy, site drainage would continually be positively controlled throughout the process of the engineered fill placement.

### Steep Slopes and High Erosion Potential

Potential sediment erosion is particularly important given the presence of steep slopes on both Sites and high erosion hazard areas. According to Nevada County LUDC, management plans are required for work within areas of steep slopes (having gradients of 30 percent or greater) and high erosion hazard. According to Section L-II 4.3.13(B)(2), high erosion hazard areas are “Areas determined to have highly-erodible soils based on soils surveys prepared by the U.S. Soil Conservation Service and U.S. Forest Service.” Both steep slopes and high erosion hazard areas are discussed in more detail for each Site below.

#### *Centennial Industrial Site*

For the Centennial Industrial Site, the USDA NRCS soil survey maps soil in the southern portion of the Site as having severe erosion hazard potential. Much of this area will not be disturbed by the placement of engineered fill. Existing high erosion mine tailings would be remediated under DTSC oversight pursuant to an approved RAP, and revegetated after final grading, limiting areas of high erosion potential tailings under the baseline condition.

Areas of steep slopes are depicted on Figure 4.6-4, which is based on a grading plan prepared by Nevada City Engineering, Inc. Overall, the Site is relatively gently-sloping. Nevada City Engineering, Inc. estimated that the proposed area of disturbance created from placement of engineered fill from the mine would include a maximum of approximately 4.1 acres of steep slopes. This estimate is an absolute maximum because it reflects existing physical conditions at the Centennial Industrial Site, whereas, a portion of these steep slope areas would be removed during remediation activities, which remediation activities are not part of the proposed project. The majority of the

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<sup>20</sup> NCE. *Preliminary Drainage Analysis and Detention Basin Sizing for Centennial and Brunswick Industrial Sites* [pg. 4]. October 2019.



steep slope area is a result of cut and fill associated with the historical mine tailings ponds and the dam on the eastern Site boundary. Discontinuous and infrequent pockets of native slope gradients 30 percent or greater are present within an area to receive mine rock fill in the central and southern portions of the proposed disturbance area. The fill is to be placed against the native slope, resulting in a relatively flat finished grade that extends to the north, away from the native slope face, as depicted on Figure 4.6-4. During construction, drainage improvements and erosion and sediment control measures are to be implemented, as shown on Figure 4.6-4.

#### *Brunswick Industrial Site*

High erosion hazard areas on the Brunswick Industrial site are limited to the Aiken loam soil type (15-50 percent slopes), which have a severe erosion hazard potential. The Aiken loam (15-50 percent slopes) comprise approximately 15.5 percent of the overall 119-acre site, as shown in Figure 4.6-2. The soils are generally located in the central-southwest and southeast portions of the Site, and small isolated areas along Brunswick Road.

Areas of steep slopes are depicted on Figure 4.6-5, which is based on a grading plan prepared by Nevada City Engineering, Inc. Nevada City Engineering, Inc. estimated that the proposed area of disturbance created from placement of engineered fill from the mine would include approximately 6.8 acres of steep slopes. The majority of this steep slope area is a result of cut and fill associated with Brunswick Road and the historical mining and lumber operations. Discontinuous pockets of native slope gradients 30 percent or greater are present within an area to receive mine rock fill on the southwestern edge of the proposed disturbance area. The fill is to be constructed against these steep slopes, resulting in a relatively flat finished grade that extends to the southeast away from the native slope face, as depicted on Figure 4.6-5. During construction, drainage improvements and erosion and sediment control measures are to be implemented, as shown on Figure 4.6-5.

#### *East Bennett Road ROW*

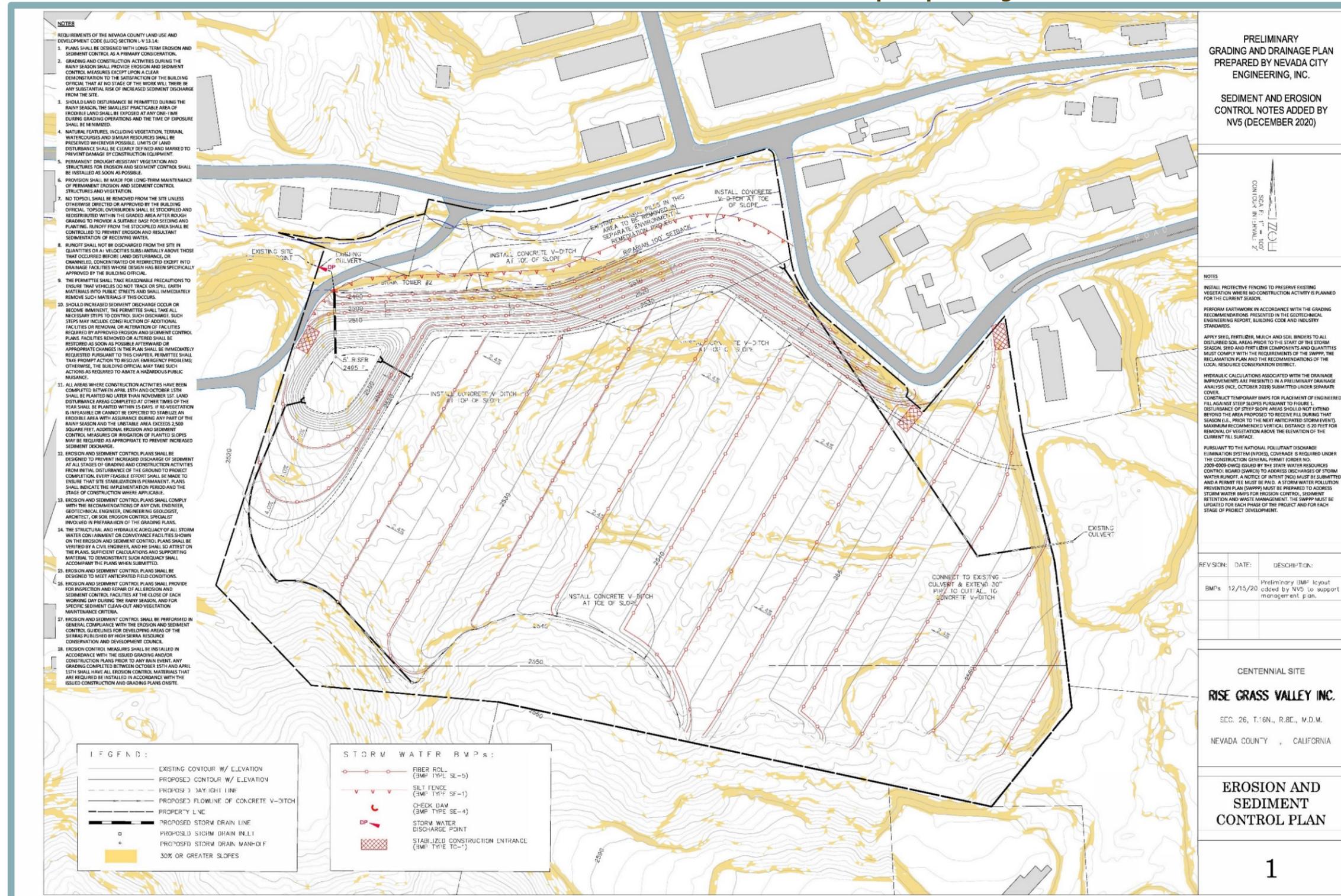
High erosion hazard areas within the East Bennett Road ROW include the Boomer soil type (BrE). The Boomer (BrE) soil type is located in the western portion of the East Bennett Road ROW area, wherein the potable water supply line would be installed by the proposed project. No steep slopes are located in the East Bennett Road ROW.

#### Management Plans for Steep Slopes and High Erosion Potential (Centennial and Brunswick Industrial Sites, 2020)

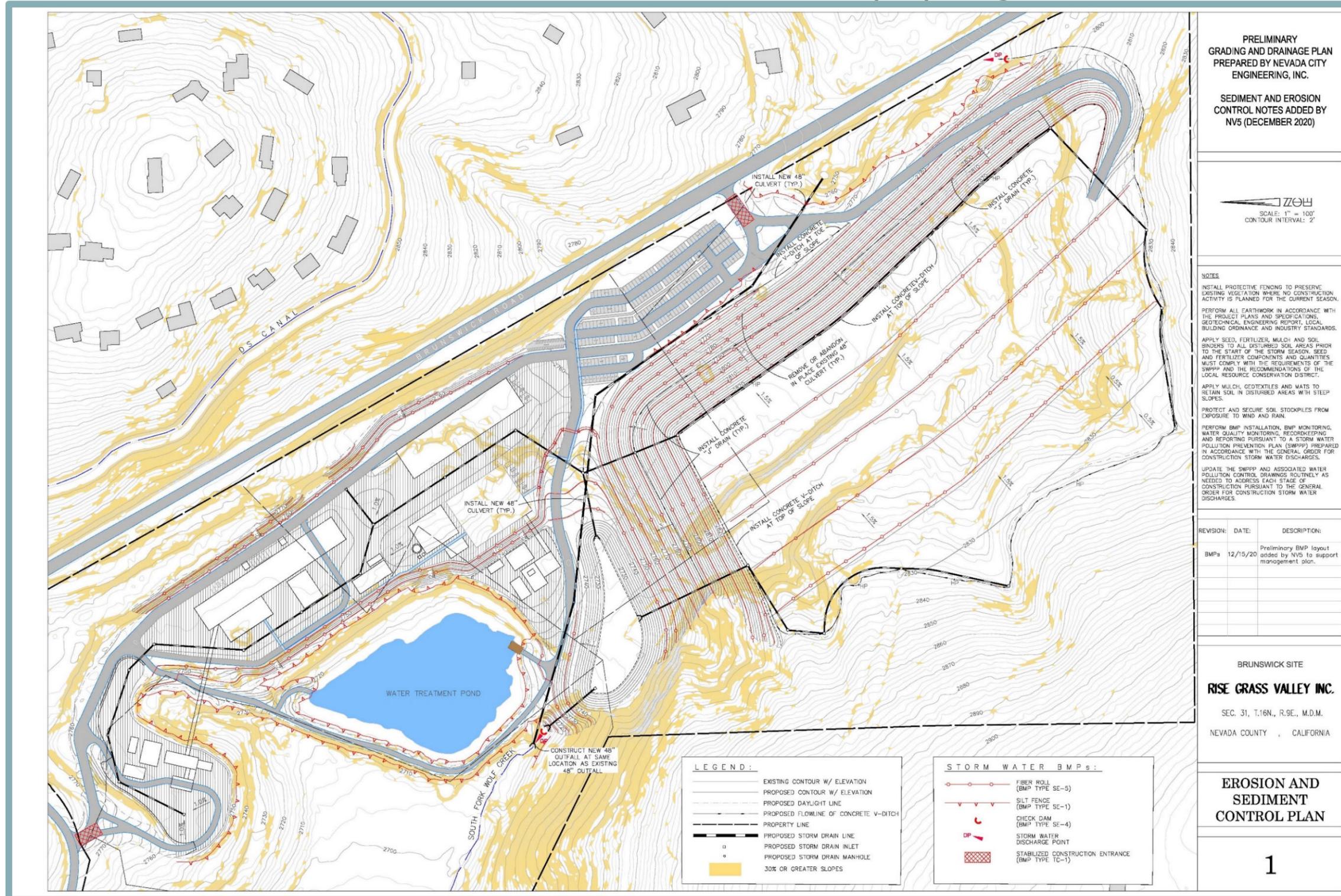
As previously discussed, these management plans were prepared pursuant to Nevada County LUDC Section L-II 4.3.13 to provide a professional site-specific inventory and analysis of steep slope (slopes of 30+ percent) and high erosion potential areas of the Sites, and to evaluate these constraints and recommend mitigation and/or managed alternatives to avoid or reduce the impacts. The inventory and analyses are performed for the entire Sites, including all areas of proposed disturbance.



Figure 4.6-4  
Centennial Industrial Site Erosion Control Plan and Steep Slopes Diagram



**Figure 4.6-5  
 Brunswick Industrial Site Erosion Control Plan and Steep Slopes Diagram**



PRELIMINARY  
 GRADING AND DRAINAGE PLAN  
 PREPARED BY NEVADA CITY  
 ENGINEERING, INC.

SEDIMENT AND EROSION  
 CONTROL NOTES ADDED BY  
 NV5 (DECEMBER 2020)

SCALE: 1" = 100'  
 CONTOUR INTERVAL: 2'

**NOTES**

INSTALL PROTECTIVE FENCING TO PRESERVE EXISTING VEGETATION WHERE NO CONSTRUCTION ACTIVITY IS PLANNED FOR THE CURRENT SEASON.

PERFORM ALL EARTHWORK IN ACCORDANCE WITH THE PROJECT PLANS AND SPECIFICATIONS, GEOTECHNICAL ENGINEERING REPORT, LOCAL BUILDING ORDINANCE AND INDUSTRY STANDARDS.

APPLY SEED, FERTILIZER, MULCH AND SOIL BINDERS TO ALL DISTURBED SOIL AREAS PRIOR TO THE START OF THE STORM SEASON. SEED AND FERTILIZER COMPONENTS AND QUANTITIES MUST COMPLY WITH THE REQUIREMENTS OF THE SWPPP AND THE RECOMMENDATIONS OF THE LOCAL RESOURCE CONSERVATION DISTRICT.

APPLY MULCH, GEOTEXTILES AND MATS TO RETAIN SOIL IN DISTURBED AREAS WITH STEEP SLOPES.

PROTECT AND SECURE SOIL STOCKPILES FROM EXPOSURE TO WIND AND RAIN.

PERFORM BMP INSTALLATION, BMP MONITORING, WATER QUALITY MONITORING, RECORDKEEPING AND REPORTING PURSUANT TO A STORM WATER POLLUTION PREVENTION PLAN (SWPPP) PREPARED IN ACCORDANCE WITH THE GENERAL ORDER FOR CONSTRUCTION STORM WATER DISCHARGES.

UPDATE THE SWPPP AND ASSOCIATED WATER POLLUTION CONTROL DRAWINGS ROUTINELY AS NEEDED TO ADDRESS EACH STAGE OF CONSTRUCTION PURSUANT TO THE GENERAL ORDER FOR CONSTRUCTION STORM WATER DISCHARGES.

REVISION:	DATE:	DESCRIPTION:
BMPs	12/15/20	Preliminary BMP layout added by NV5 to support management plan.



Section 5 of each management plan provides mitigation measures that would ensure appropriate erosion and sediment control during disturbance within areas of steep slopes and high erosion hazard areas, including but not limited to implementation of the Erosion and Sediment Control Plans (ECP) prepared for the Centennial and Brunswick Industrial Sites (see Figure 4.6-4 and Figure 4.6-5). Pursuant to LUDC Section L-V 13.14, the ECPs were prepared with long-term erosion and sediment control as a primary consideration. The ECPs depict the long-term controls at final project development. The temporary Best Management Practices (BMPs) added to the plan are intended to provide short-term erosion and sediment controls until vegetation is established.

The management plans also outline the ongoing monitoring that would be required pursuant to the State NPDES Construction General Permit. For example, the applicant will be required to conduct post rain event visual observations to (1) identify whether BMPs were adequately designed, implemented, and effective, and (2) identify additional BMPs and revise the SWPPP accordingly.

### Reclamation

For the engineered fill areas of the Centennial and Brunswick Industrial Sites, after final grading activities have been completed, planting areas would be prepared for the 3:1 engineered fill slopes. Revegetation of the final engineered fill stockpile lift/level would occur using an erosion-control native seed mix within six months and prior to the upcoming rainy season.

For the Brunswick Industrial Site, equipment, vehicles, and the general contents of all structures on-site would be removed. The structures that would be removed include the headframes for the main and service shafts and the covered conveyor associated with the main headframe. All remaining buildings and structures would remain.

### Conclusion

The proposed project would involve grading and construction activities at the Centennial and Brunswick Industrial Sites, as well as along East Bennett Road for installation of the potable water supply pipeline. During construction and engineered fill placement at the Centennial and Brunswick Industrial Sites, topsoils would be disturbed and stockpiled and could be subject to increased potential for erosion and loss of topsoil. Without implementation of the mitigation measures in the Steep Slope and High Erosion Potential Management Plans, the proposed project could have a **significant** impact related to substantial soil erosion or the loss of topsoil.

It is also noted that the project will be conditioned to ensure that, if, at any time during construction, a field review by County Building Department personnel indicates a significant deviation from the proposed grading shown on the Improvement Plans, specifically with regard to slope heights, slope ratios, erosion control, winterization, and/or tree disturbance, the plans shall be reviewed by the Nevada County Planning and Building Departments for a determination of substantial conformance, pursuant to Nevada County Land Use and Development Code Sec L-V 13.15, prior to any further work proceeding.



### Mitigation Measure(s)

Implementation of the following mitigation measure would reduce the above impact to a *less-than-significant* level.

4.6-2 *Prior to approval of Improvement Plans, the Plans shall incorporate the Mitigation Measures and Best Management Practices (BMP) included in Section 5 of the Management Plans for Steep Slope and High Erosion Potential (Centennial Industrial Site and Brunswick Industrial Site, 2020), as approved in their final form by Nevada County. Mitigation Measures and BMPs set forth in the Management Plans include but are not limited to:*

- *Incorporating the provisions of the Erosion and Sediment Control Plans (ECPs) (December 15, 2020) into the project design, including the “Notes” on the ECPs; including but not limited to the following:*
  - *The structural and hydraulic adequacy of all storm water containment or conveyance facilities shown on the ECPs shall be verified by a civil engineer, and he/she shall so attest on the Plans, with proof provided to Nevada County prior to any project grading, clearing, or tree disturbance.*
  - *Soil stockpiling shall have proper erosion control measures applied to control runoff and prevent erosion.*
  - *All areas where construction activities have been completed between April 15th and October 15th shall be planted no later than November 1st. Land disturbance areas completed at other times of the year shall be planted within 15 days. If re-vegetation is infeasible or cannot be expected to stabilize an erodible area with assurance during any part of the rainy season and the unstable area exceeds 2,500 square feet, additional erosion and sediment control measures or irrigation of planted slopes may be required, as determined appropriate, to prevent increased sediment discharge.*
- *Obtaining coverage under the SWRQB NPDES Construction General Permit (Order No. 2009-0009-DWQ), including:*
  - *Submittal of a Notice of Intent (NOI) and payment of permit fee(s);*
  - *Preparation and implementation of a Storm Water Pollution Prevention Plan (SWPPP) for each Site;*
- *Performing earthwork in accordance with the grading recommendations presented in the Centennial Industrial Site and Brunswick Industrial Site Geotechnical Engineering Reports (NV5);*
- *Prohibiting disturbance of steep slopes (slopes of 30+ percent) beyond the area proposed to receive fill during that season (i.e., prior to the next anticipated storm event);*
- *Monitoring of Mitigation Measures in accordance with the Construction General Permit monitoring requirements, as set forth in Section 5.3 of the Management Plans; and*



- *Implementation of remedial measures in the event that water quality standards set forth in the Construction General Permit are not being met.*

**4.6-3 Be located on a geological unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse, or be located on expansive soil, as defined in Table 18-1B of the UBC. Based on the analysis below and with implementation of mitigation, the impact is *less than significant*.**

Issues associated with unstable geologic units and/or soils, including landslide, lateral spreading, subsidence, liquefaction, and collapse are discussed below.

#### Expansive Soils

Expansive soils are characterized by their ability to undergo significant volume change due to variation in moisture content. Near the surface, the resulting movements can heave and crack lightly loaded shallow foundations (spread footings) and slabs and pavements. The detrimental effects of expansive soils can be reduced by pre-swelling the expansive soils and covering them with a moisture fixing and confining blanket of properly compacted select fill.

For the Centennial Industrial Site, Engeo (2007) encountered potentially expansive clay/silt layers within the mine tailings. The laboratory test results indicated that these soils exhibit low to moderate shrink/swell potential with variations in moisture content. Moderately to highly expansive soil layers were encountered in other on-site locations. Engeo characterized their explorations as having a limited amount of potentially expansive clay.<sup>21</sup>

NV5 performed expansive soil testing at the Brunswick Industrial Site (2019) and determined that the potential for expansive soil hazards to affect the proposed improvements is considered to be moderate to high. Thin lenses of expansive fine-grained near-surface soils are present at the Site.

#### Liquefaction

Liquefaction occurs when saturated fine-grained sands and/or silts lose physical strength temporarily during earthquake induced shaking and behave as a liquid due to the loss of point-to-point grain contact and transfer of normal stress to the pore water. Liquefaction potential varies with water level, soil type, material gradation, relative density, and probable intensity and duration of ground shaking. The Geotechnical Engineering Reports concluded that the overall potential for liquefaction at both the Centennial and Brunswick Industrial Sites is remote.<sup>22</sup>

<sup>21</sup> ENGENEO Incorporated. *Geotechnical Report, Idaho-Maryland Mine, Surface Facilities and Improvements, Grass Valley, California* [pg. 12]. March 6, 2007.

<sup>22</sup> NV5. *Geotechnical Engineering Report, Idaho-Maryland Mine Project – Centennial Industrial Site* [pg. 11]. December 20, 2019; NV5. *Geotechnical Engineering Report, Idaho-Maryland Mine Project – Brunswick Industrial Site* [pg. 12]. November 18, 2019.



### Landslide and Lateral Spreading

Landsliding is the natural process of relatively rapid downslope movement of soil, rock, and rock debris as a mass. The potential for landsliding is affected by the type and extent of vegetation, slope angle, degree of water saturation, strength of rocks, and the mass and thickness of the deposit. According to the Nevada County General Plan Safety Element (pg. 10-7), most of the County's soils are underlain with dense bedrock formations and lack the characteristics contributing to landslide susceptibility. Such is the case for both Sites, as they are underlain by a complex assemblage of igneous and metamorphic rocks.

Lateral spreading is another form of slope failure in which gently sloping ground is displaced. Lateral spreading is caused by the accumulation of incremental displacements that develop within liquefied soil under cyclic loading. Due to limited liquefaction potential at both Sites, lateral spreading is not a significant concern.

### Slope Stability

Pursuant to Section 3704(d) of the SMARA, final reclaimed fill slopes, including permanent piles or dumps of mine waste rock and overburden, shall not exceed 2:1 (H:V), except when site-specific geologic and engineering analysis demonstrate that the proposed final slope will have a minimum slope stability factor of safety that is suitable for the proposed end use, and when the proposed final slope can be successfully revegetated. The proposed fill slopes for the Centennial and Brunswick Industrial Sites would be more gradual at 3:1 (H:V). Therefore, no site-specific geologic and engineering analysis is required in order to show slope stability.

The proposed fill material would comprise a composite of blast rock and sand tailings produced underground. The predicted "critical gradient" (angle of repose/angle of internal friction) for compacted angular gravel and cobbles is 45 degrees (approximately 1:1), and for medium dense (compacted) sand it is 35–40 degrees (approximately 1.3:1 to 1.1:1 slopes). The inclusion of silt into these compacted granular materials would provide additional cohesion, and therefore would increase the friction angle of the fill. A conservative critical gradient of the proposed fill, for design purposes, would be 35 degrees. This would include the lower end of medium dense sand with no rock, or a fill comprising only the sand tailings. The proposed fill slope angle for the project engineered fill areas is 3:1, or 18.4 degrees, which is half of the conservative critical gradient estimate for the proposed fill material.

Following completion of fill activities, the fill slopes would be revegetated to control erosion and further ensure slope stability.

### Undocumented Fill

Areas of undocumented fill were encountered on both Sites, each of which is discussed below.

#### *Centennial Industrial Site*

Undocumented fill is identified as the primary concern by NV5 in the Centennial Industrial Site Geotechnical Engineering Report (2019). Mining waste (tailings and waste rock) and other undocumented fill are present throughout the Centennial Industrial Site (primarily the central and northern portions). The undocumented fill is typically less



than five feet deep, but is at least 12 feet deep in the northeastern corner of the eastern tailings pond (near Centennial Drive) and up to at least 20 feet deep on the northern edge of the western tailings pond. Deeper fill is present within former retention pond berms located in the north, central, and eastern portions of the Site. The undocumented fill typically includes tailings, waste rock, and soil that were not placed in accordance with the standards of geotechnical engineering practice. It is important to note that the deeper fill areas along the northern and eastern portions of the Centennial Industrial Site are planned for remediation, grading, and for the eastern portion, placement of engineered fill, pursuant to the current version of the RAP being reviewed by DTSC. Thus, under the post-remediation baseline condition for the Centennial Industrial Site, a substantial portion of the existing undocumented fill, NV5's primary geotechnical concern for the Centennial Industrial Site, would be addressed in accordance with geotechnical recommendations under DTSC oversight during remediation. Nevertheless, areas of undocumented fill would remain on the Site after remediation.

### ***Brunswick Industrial Site***

Undocumented fill is identified as a primary concern by NV5 in the Brunswick Industrial Site Geotechnical Engineering Report. During their subsurface investigation, NV5 encountered existing fill and disturbed soil throughout the property that varied in depth up to approximately 20 feet bgs. Heterogeneous fills of unknown origin, quality, and method of placement, such as those encountered, can settle and/or heave erratically under the load of new fills, structures, slabs, and pavements. Footings, slabs, and pavements supported on heterogenous fill could also crack as a result of such erratic movements. Thus, where not removed by planned grading, heterogeneous fills should not be relied upon to support proposed improvements unless it is excavated and replaced as an engineered fill consistent with the recommendations in the Geotechnical Engineering Report (i.e., Section 5.1.3).

### **Service Shaft Collar Cut Slopes at Brunswick Industrial Site**

A new mine service shaft would be developed on the Brunswick Industrial Site. The service shaft may be circular or rectangular, depending on the methods used in its construction. The service shaft would be approximately 1,000 feet southeast of the existing Brunswick shaft and developed to at least 3,280 feet bgs. The service shaft would connect to existing underground workings accessible from the Brunswick shaft. The service shaft would be equipped with a hoist and headframe that is approximately 80 feet high to provide movement of workers and materials underground, fresh air ventilation intake, and various services such as compressed air, electricity, and pipes.

The overburden (i.e., soil and weak rock) would be excavated from the surface and a concrete collar installed from the surface profile to the bedrock. The depth to bedrock is approximately 60 feet. The overburden material would be excavated to allow the shaft and concrete collar to be constructed, and then the overburden would be placed and compacted around the concrete collar to the original ground surface elevation.

NV5 expresses caution regarding potential slope instability of the steep temporary cut slopes proposed for construction of the service shaft collar. NV5 notes that potential slope instability can be mitigated by temporary cut slope design and/or shoring design for the proposed temporary excavations.



### Clay-Lined Pond Dam

As previously discussed, the exploratory borings of the clay-lined pond dam, and an interview with an equipment operator previously involved with construction of the dam, confirm that a layer of organic fill (sawdust) is present within the southwestern-most 200-foot segment of the dam. Boring logs indicate that the sawdust layer is up to 4 feet thick at the dam centerline, at a depth of approximately 12 to 18 feet bgs. The issue can be mitigated by conventional earthwork methods, including excavation and removal of the organic materials followed by replacement and recompaction of the overlying dam fill.

Based on the original topography of the dam footprint, it is likely that the organic layer thickness decreases towards the inboard section of the pond and increases towards the downslope face of the dam. NV5 recommends that the upslope face of the dam (and associated clay liner) be preserved during the repairs by the construction of a temporary cut slope. Based on soil conditions observed in the upper fill during NV5's drilling program, NV5 anticipates that a temporary cut slope gradient of approximately 1:1 (H:V) would be feasible during the repairs, provided that the water level in the pond is managed so that seepage is not present in the cut slope. A grading plan, cross-sections, and slope stability analysis of proposed cut slopes should be prepared to describe the proposed earthwork repair prior to grading.<sup>23</sup>

### Collapse

Several near-surface mine features are located within the vicinity of the project sites, some of which have been previously closed. Near-surface mine features are generally more susceptible to subsidence and collapse than are deeper mine workings. The near-surface features may be located in weaker materials (soil and weathered rock), whereas the deeper mine workings are commonly located in competent bedrock. In addition, when the water level in the mine workings is located near the ground surface, the drawdown of groundwater within the mine workings may increase the potential for settlement or collapse of shallow workings that were not formally closed. Near surface workings that are already in a dewatered state would generally not be significantly impacted by dewatering the mine.

Potential for collapse of existing near-surface mine features as a result of the proposed project was evaluated by NV5, whose report was independently peer reviewed by ECM. Collapse, as discussed here, is not the same as "sink holes" that occur within limestone environments where a gaping hole forms that may be tens or even hundreds of feet across. These sinkholes are caused by the dissolution of the underlying limestone creating a cave, or cavern, just below the ground surface. As dissolution proceeds, the cavern becomes larger and larger, and at some point, the rock can no longer support the ground surface above it, and failure occurs. This catastrophic failure often occurs as a result of pumping related drawdown of the water table because the water had been providing some, albeit minimal buoyant support, for the overlying rock in spite of the rock's higher density.

This type of failure would not be expected of known existing mine shafts in the project area. Instead, the mine-related voids in the Grass Valley area are steeply dipping to

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<sup>23</sup> NV5. *Geotechnical Engineering Report, Idaho-Maryland Mine Project – Brunswick Industrial Site* [pg. 11]. November 18, 2019.



vertical, features and their widths generally range from as narrow as a few inches and rarely exceed 4 feet. As a result, any caving of a vein would be limited to the width of the vein, and it would occur at the exact point at which the vein outcrops on the surface. As the area where potential failure along the vein's outcrop might occur are so small, buoyancy would not be a factor and the failure would wholly occur as a result of the breakdown of the rock itself. Typically, the length of one of these failures might be as short as a couple of feet, with the maximum length rarely exceeding 20 feet. The location of a potential collapse can usually be accurately predicted based on the location of the vein's surface outcrop.

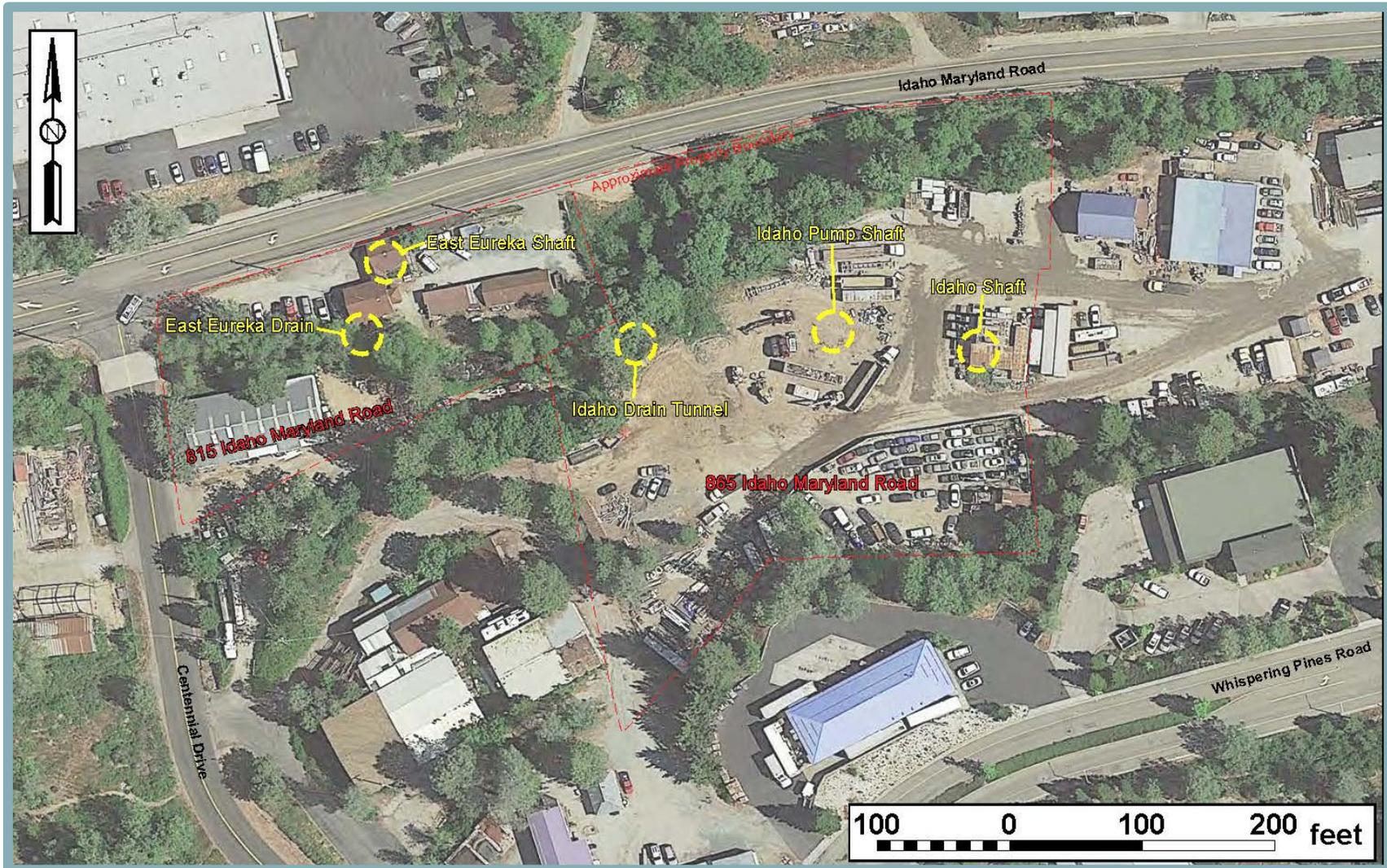
A second type of failure can occur around mine shafts, which are vertical or near-vertical openings. Some shafts are set directly into bedrock, and the collars of these features are quite stable due to the competency of the rock. At other locations, the shafts might have been sunk through surface soils and weathered rock for the first few feet, and as a result, ground support must be constructed to keep the soils and weathered rock from sluffing into the shaft. In these cases, the shafts are generally supported using wooden timbers, and when the timbers finally rot, they allow the rock and debris along the sides to cave into the shaft. This type of collapse generally produces a cone-shaped opening where the slope of the bottom of the cone is dependent on the internal angle of friction of the surrounding material.

Based on a Geotechnical Assessment of Near Surface Mine Features prepared by NV5, several near-surface features are recommended for closure as part of the proposed project. Physical closure is recommended at the East Eureka Shaft, East Eureka Drain, Idaho Drain Tunnel, Idaho Pump Shaft and Idaho Shaft, which are currently open or partially-closed (see Figure 4.6-6). In general, these near-surface features are located within developed or disturbed areas of the existing industrial complex south of Idaho Maryland Road and north of Whispering Pines Lane, east of the Centennial Industrial Site. The proposed closure measures are readily implemented, and cooperation agreements are in place between Rise and the property owners to allow Rise to assist the property owners with closure.

The expected course of action would be to overexcavate surface soil in the areas of these features to determine where competent, native soil/rock is located and attempt to identify the trend of any subsurface mining-related structures (i.e., tunnel, shaft, drift, etc.). Once the alignment and limits of the feature are established, a geotechnical engineer would provide recommendations for physical closure of the feature, including a narrative and a cross section, stamped by a licensed geotechnical engineer. The recommended closure methods are anticipated to include the use of a cast-in-place concrete cap or plug supported by temporary false work and covered to the ground surface with engineered fill. Given that groundwater discharges from several of these features, drain pipes would be incorporated to allow the continued flow of groundwater once the mine is reclaimed and allowed to flood again. Typical equipment utilized for repairs of this nature may include a large excavator (Cat 320 or equivalent), mid-size backhoe or loader, haul truck, concrete trucks and concrete pump. Typical duration for such closure activities take approximately a week to complete; however, the site accessibility, weather, contractor scheduling, and scale of the effort would govern scheduling of such work.



**Figure 4.6-6**  
**Near-Surface Mine Features Identified for Closure**



Source: NV5, 2020.



The Geotechnical Engineering Report for the Centennial Industrial Site recommends closure of one additional near-surface mining feature. The historical South Idaho Shaft is mapped in the southeastern portion of the Centennial Industrial Site, near the upper, southern edge of the proposed engineered fill pad. No records of physical closure of the mine portal are known. NV5 believes the South Idaho workings are not connected to the Idaho-Maryland Mine workings. The abandoned mine feature may be unsuitable for support of future structural improvements and may present potential physical hazards. Because the historically mapped feature is located in an area of shallow fill that may be developed in the future, the portal should be located and physically closed in accordance with recommendations from a qualified geotechnical engineer.

### Conclusion

Both the Centennial and Brunswick Industrial Sites have geotechnical characteristics related to undocumented fill and thin lenses of expansive soils. Additional geotechnical issues are specific to each site. For the Brunswick Industrial Site, a portion of the existing clay-lined pond dam contains a layer of sawdust, thus compromising the geotechnical stability of the dam. The proposed installation of the new service shaft collar on the Brunswick Industrial Site would require temporary steep cut slopes that could become unstable. For the Centennial Industrial Site, the presence of the South Idaho Shaft poses a safety consideration for potential future on-site development. Other near-surface mine features require closure prior to initial mine dewatering to ensure that collapse does not occur. Therefore, a **significant** impact could occur with respect to being located on a geological unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse, or be located on expansive soil, as defined in Table 18-1B of the UBC.

### Mitigation Measure(s)

Implementation of the following mitigation measures would reduce the above potential impacts to a *less-than-significant* level.

4.6-3(a) *The Improvement Plan submittals shall include final geotechnical engineering reports produced by a California Registered Civil Engineer or Geotechnical Engineer. The Improvement Plans shall include the recommendations of the Geotechnical Engineering Reports, including but not limited to the following:*

- *Grading*
- *Import Fill*
- *Existing Fill*
- *Cut Slope Grading*
- *Engineered Fill Placement*
- *Fill Slope Grading*

*In accordance with the recommendations from the Geotechnical Engineering Reports (Geotechnical Engineering Report, Idaho-Maryland Mine Project – Brunswick Industrial Site. November 18, 2019; and Geotechnical Engineering Report, Idaho-Maryland Mine Project –*



Centennial Industrial Site. December 20, 2019), grading plan review and construction monitoring shall occur, as follows:

- Prior to construction, a licensed geotechnical engineer shall be retained at the applicant's expense to review the final grading plans to confirm whether the recommendations from the Geotechnical Engineering Reports have been adequately incorporated in the plans, and to provide additional and/or modified recommendations, if necessary; and
- The applicant shall retain a licensed geotechnical engineer to perform construction quality assurance (CQA) monitoring during all earthwork grading performed by the contractor to determine whether the recommendations of the Geotechnical Engineering Reports have been implemented, and if necessary, provide additional and/or modified recommendations.

A CQA report demonstrating successful compliance with Geotechnical Engineering Report recommendations in all on-site earthwork shall be submitted to Nevada County periodically, but not less than once per quarter.

4.6-3(b) In conjunction with submittal of Improvement Plans for the Brunswick Industrial Site, the applicant shall submit a grading plan, cross sections, and a slope stability analysis of proposed cut slopes for the new service shaft collar and the clay-lined pond dam repair work, for review and approval of the Nevada County Building Department. The submittal shall be prepared and stamped by a licensed geotechnical engineer. The grading plan and cross sections shall depict typical temporary cut slope gradients, excavation depths, maximum water surface elevation, and earthwork volume estimates, and any additional geotechnical engineering methods, such as shoring, to mitigate potential slope instability.

4.6-3(c) In conjunction with submittal of Improvements Plans for the Centennial and Brunswick Industrial Sites, the applicant shall submit a physical closure evaluation of the following near-surface mine features to the Nevada County Building Department:

- East Eureka Shaft (shall be closed prior to initial mine dewatering)
- East Eureka Drain (shall be closed prior to initial mine dewatering)
- Idaho Drain Tunnel (shall be closed prior to initial mine dewatering)
- Idaho Pump Shaft (shall be closed prior to initial mine dewatering)
- Idaho Shaft (shall be closed prior to initial mine dewatering)
- South Idaho Shaft (shall be closed prior to placement of engineered fill at the Centennial Industrial Site)

The evaluation shall be stamped by a licensed geotechnical engineer and identify methods of physical closure, based on overexcavation of surface soil in the areas of these features to determine where competent, native soil/rock is located and to identify the trend of any subsurface mining-



*related structures. Closure methods could include but not be limited to the use of a cast-in-place concrete cap or plug supported by temporary false work and covered to the ground surface with engineered fill. The closure design shall include drainage piping for those near surface features that currently discharge groundwater, and closure shall occur prior to initial mine dewatering or, for the South Idaho Shaft, prior to the placement of engineered fill at the Centennial Industrial Site.*

**4.6-4 Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water. Based on the analysis below and with implementation of mitigation, the impact is *less than significant*.**

An on-site septic field system would be built at the Brunswick Industrial Site for the permanent toilets, sinks, and shower facilities planned. The proposed septic system would be required to comply with the County's OWTS and LAMP. In compliance with the OWTS and LAMP, a septic system permit would be required from the County in order to construct and operate the proposed septic system. As part of the permit application, an on-site soils evaluation is required to be prepared and submitted to the County for review and approval. Accordingly, a septic system evaluation was prepared for the proposed project by Navo & Sons, Inc. (see Appendix H-8). The septic system evaluation involved eight soil test pits at the proposed location of the septic system, determination of the average percolation rate around the soil test pits, estimation of the amount of wastewater associated with the proposed project operations, and determination of the appropriate size and design for the septic system to adequately handle the proposed project's wastewater generation. The percolation tests were performed under the guidelines set forth in Nevada County Sewage Disposal Technical Regulations, and testing was conducted under the supervision of the Nevada County Environmental Health Department (NCEHD).

According to the septic system evaluation, a relatively large, acceptably permeable soil area has been identified within the proposed leach field area. The evaluation concludes that the project site is suited for a Pressure Dose sewage disposal system with a minimum of 1,935 lineal feet of leach line. A minimum 10,000-gallon septic pump tank with watertight risers over each lid and outlet effluent filter would be required. The pump tank would be oversized in order to accommodate for potential power loss, backups, and surge flows in the future. The septic system evaluation recommends annual pumping of the tanks, biannual inspection of the tanks to monitor solids and pumping when the tank reaches 25 percent capacity. The evaluation includes a number of additional requirements and recommendations necessary to ensure that the design is adequate to handle the proposed project wastewater demands and obtain a permit from the County for the septic system. Without implementation of the requirements and recommendations set forth in the septic system evaluation, the proposed septic system could result in a ***significant*** impact to the environment.



### Mitigation Measure(s)

Implementation of the following mitigation measure, which includes the requirements and recommendations specified in the septic system evaluation discussed above, would reduce the above potential impact to a *less-than-significant* level.

4.6-4 *In conjunction with submittal of Improvement Plans, the project applicant shall submit a complete sewage disposal design report accounting for all sewage waste water disposal per project buildout, for review and approval of the Nevada County Environmental Health Department. Unless otherwise determined in the sewage disposal design report, the Improvement Plans shall comply with the recommendations set forth in the septic system evaluation prepared for the Brunswick Industrial Site by Navo & Sons, Inc., including the following:*

- *Leach lines shall be installed 36 inches wide by 24 inches deep, with 12 inches of drain rock and 7-foot separation on center per line, installed level on contour.*
- *The leach shall be pressure dosed leach lines consisting of a minimum of four zones. The rotation of zones would allow the zones to rest in between doses and prevent over saturation of any one zone. In addition, if one zone has a problem, that zone could be isolated and repaired while other zones are working. This would result in little to no downtime and greatly reduce the possibility of sewage spills (surfacing).*
- *Duplex (two) pumps shall be used in the pump tank to ensure that if one pump fails, a backup exists. The pumps would alternate to the extent of their life, unless one fails.*
- *Due to the distance and elevation between the proposed shower and laundry area to the leach field, the pump line would be running through a low area upgradient from potentially sensitive areas. The pump line shall be sleeved in this low area to avoid potential issues related to sensitive areas if the line were to rupture.*
- *During installation, existing trees shall be maintained in place to the extent feasible to avoid the creation of large holes in the leach area, help stabilize soil, and help absorb leaching effluent.*
- *The following setbacks shall be maintained:*
  - *10 feet from developed property lines;*
  - *50 feet from undeveloped property lines;*
  - *50 feet from seasonal drainages;*
  - *25 feet from center line of swales; and*
  - *100 feet from any perennial streams or domestic wells.*
- *The pressure dose septic system shall be maintained annually for the life of the system.*
- *The septic system shall be installed by a licensed contractor (A, C-34, or C-42) familiar with installation of the proposed system.*
- *A permit to install the septic system shall be obtained from the NCEHD.*
- *The pump screen shall be removed and rinsed annually.*



- The pump, pump float, alarm float, and alarm shall be checked for proper operation annually.
- The primary and 100 percent repair area shall be protected from vehicular traffic, structures, or any other activity that may cause alterations such as grading, cuts/fills, etc.
- All drainage shall be diverted away from the septic tank, pump tank, and leach field. Irrigation in the area of the leach trenches shall be kept to a minimum to avoid saturation of the soil. Drip irrigation should be used.
- Water conservation is recommended to maximize the life expectancy of the absorption trenches.
- Any leaks shall be fixed immediately to avoid unnecessary saturation of the leach trenches.

**4.6-5 Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. Based on the analysis below, the impact is *less than significant*.**

The Centennial and Brunswick Industrial Sites are located within a region underlain by a complex assemblage of igneous and metamorphic rocks in the western foothills of the Sierra Nevada. Fossils are unlikely to survive the heat and pressure involved in the formation of igneous and metamorphic rocks. The paleontology records of the University of California Museum of Paleontology do not contain any recorded occurrences of fossils in or near the project area.<sup>24</sup> Due to unfavorable geological conditions and the absence of any previously discovered fossil resources in the project area, the project is considered to have low or no potential to destroy a paleontological resource.

Unique geologic features have not been identified within the Centennial and Brunswick Industrial Sites, with the exception of gold-bearing quartz veins underlying portions of the mineral rights boundary, which are discussed in Impact 4.6-6.

As a result, the proposed project would have a ***less-than-significant*** impact related to Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.

Mitigation Measure(s)

*None required.*

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<sup>24</sup> Personal communication between Patricia A. Holroyd, Ph.D., Senior Museum Scientist, Museum of Paleontology, University of California Berkeley, and Nick Pappani, Vice President, Raney Planning and Management, Inc., January 5, 2021.



**4.6-6 Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State or of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan. Based on the analysis below, the impact is *less than significant*.**

The majority of the proposed subsurface mining areas are located within areas designated by the state as Mineral Resource Zone (MRZ) MRZ-2, with some outlying areas located within MRZ-3. According to the State, MRZ-2 are those “Areas of Identified Mineral Resource Significance.” According to Nevada County LUDC, Section L-II 4.3.11, *Significant Mineral Areas* are “Areas where information indicates that significant mineral deposits are likely present based on State Division of Mines and Geology’s Nevada County Mineral Classification Report Maps, referred to as Mineral Resource Zones - 2 (MRZ-2).” According to the State, MRZ-3 are “Areas of Undetermined Mineral Resource Significance.”

The Resource Standards related to Mineral Areas in the Nevada County Land Use and Development Code are intended to protect significant mineral areas (MRZ 2) from incompatible land uses. If projects not associated with mineral extraction are proposed in Significant Mineral Areas they shall not be approved unless a management plan is prepared or the project is within the Industrial General Plan designation. The proposed project’s expressed purpose is to extract minerals within known Significant Mineral Areas; thus, a management plan is not required, and the project would provide availability of known mineral resources important to the State, rather than result in loss of availability of a known mineral resource. The proposed project would make these known gold mineral resources available by dewatering the Idaho-Maryland Mine and recommencing mining operations.

Therefore, the proposed project would have a *less-than-significant* impact related to resulting in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State, or of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan.

Mitigation Measure(s)

*None required.*

**Cumulative Impacts and Mitigation Measures**

For detail regarding the cumulative setting for this EIR analysis, refer to Chapter 5, Statutorily Required Sections, of this EIR. Project-specific impacts are not identified for paleontological resources or mineral resources; thus, the project would not have the potential to contribute to cumulative impacts on these resources.



**4.6-7 Cumulative increase in the potential for geological related impacts and hazards. Based on the analysis below, the cumulative impact is *less than significant*.**

The above-discussed geological constraints and hazards are localized to the specific overall project site, and potential impacts are associated with the site-specific geophysical properties and the grading and extraction characteristics of the proposed project. For example, impacts resulting from development on expansive soils at one project site are not worsened by impacts from development on expansive soils or undocumented fill at another project site. Rather, the soil conditions, and the implications of such conditions for each project, are independent. Recommendations in the Geotechnical Engineering Reports and Management Plans prepared for the proposed project would be incorporated into project plans and specifications to mitigate any potential geologic and soils impacts.

Soil erosion could be considered a cumulative effect if multiple projects are built along a waterway that could be subject to erosion/sedimentation as a result of inadequate erosion controls. Both the Centennial and Brunswick Industrial Sites are proximate to waterways (Wolf Creek and South Fork Wolf Creek, respectively), and while work would be done in close proximity to these waterways, rigorous erosion control BMPs would be implemented prior to and during construction, as required in Mitigation Measure 4.6-2 of this chapter, to ensure that substantial soil erosion and downstream sedimentation would not occur. Other projects that could contribute to cumulative soil erosion effects in the area also would be required to implement similar grading and erosion control standards by the local government jurisdictions responsible for issuing grading permits, including application of erosion control BMPs that are required elements of NPDES General Construction Permits. This would reduce cumulative impacts involving construction-generated erosion to below a level of significance. The incremental effects of the cumulative projects would not combine to result in a cumulatively significant impact, and the proposed project would result in a less than significant contribution to cumulative impacts on geology and soils in the area.

As such, the potential for cumulative impacts related to geology, soils, seismicity and mineral resources, to which implementation of the proposed project might contribute, is ***less than significant***.

Mitigation Measure(s)

*None required.*

