

Project No. 5279.02
January 2, 2020 (Revised January 9, 2020)

Rise Grass Valley, Inc.
Ben Mossman, President
333 Crown Point Circle, Suite 215
Grass Valley, California 95945

Reference: **Idaho-Maryland Mine Project – Brunswick Industrial Site**
SW Corner of Brunswick Road and East Bennett Road
APNs 006-441-003, 006-441-004, 006-441-005, 006-441-034, 009-630-037, 009-630-039
Grass Valley, California 95945

Subject: **Steep Slope, Erosion and Sediment Control Management Plan**

Dear Mr. Mossman,

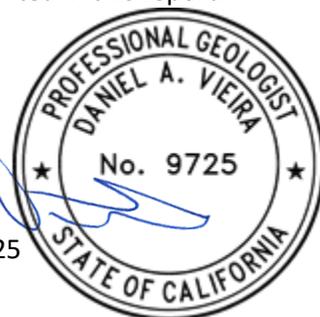
This report presents our management plan addressing construction on steeply sloping portions of the proposed construction at the 119-acre property (herein referred to as the “Site” or “subject site”) located at the southwest corner of Brunswick Road and East Bennett Road in Grass Valley, California. As proposed, the project is to include development of industrial facilities associated with proposed underground hard rock mining operations. Because grading is proposed in areas where native slope gradients exceed 30 percent (herein referred to as “steep slopes”), the Nevada County Community Development Agency requires the preparation of a management plan to facilitate review and permitting of the proposed improvements.

The conclusions and recommendations presented in this management plan are based on our understanding of the proposed development, a surface reconnaissance and subsurface investigation at the Site, review of published geologic and soil survey maps, and our experience with subsurface conditions in the area. We understand that proposed site development includes grading in steep slope areas. Our opinion is that the proposed development in steep slope portions of the property are feasible, provided the recommendations included in this management plan are incorporated into the project plans and specification in conjunction with the grading recommendations provided in the project Geotechnical Engineering Report, dated November 18, 2019.

Please contact us if you have any questions regarding our observations or the conclusions and recommendations presented in this report.

Sincerely,

NV5



Daniel A. Vieira, P.G. 9725
Project Geologist



Chuck Kull, G.E. 2359
Principal Engineer

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CONSTRUCTION QUALITY ASSURANCE – INFRASTRUCTURE – ENERGY – PROGRAM MANAGEMENT – ENVIRONMENTAL

1.0 INTRODUCTION

At the request of Ben Mossman of Rise Grass Valley, Inc., NV5 prepared this management plan to address proposed grading construction on steeply sloping portions of the 119-acre property located at the southwest corner of Brunswick Road and East Bennett Road in Grass Valley, California. Because the proposed improvements will include grading in areas with slope gradients that exceed 30 percent, the Nevada County Community Development Agency requires the preparation of a management plan.

We provided geotechnical engineering recommendations for the project in our report entitled *Geotechnical Engineering Report; Idaho-Maryland Mine Project – Brunswick Industrial Site*, dated November 18, 2019. Our geotechnical engineering investigation included a site reconnaissance and literature review pertaining to soil conditions and site geology, and a subsurface investigation. The findings of our investigation were used to prepare this management plan.

2.0 SCOPE OF SERVICES

To prepare this management plan, we reviewed the findings of our investigation for the project, as well as the geotechnical engineering recommendations presented in our report. Based on findings made during our site reconnaissance and subsurface investigation, results of our literature review, and our experience with soil conditions in the area, we prepared this plan which provides additional recommendations for earthwork and erosion control associated with the proposed grading improvements on steeply sloped portions of the Site.

3.0 SITE DESCRIPTION

The Site comprises approximately 119 acres and is located approximately 2 miles east-southeast of downtown Grass Valley in Nevada County, California. According to the Nevada County Geographical Information System (GIS) online database (<https://gis.nevcounty.net/MyNeighborhood/>) the subject property is associated with assessor's parcel numbers (APNs) 006-441-003, 006-441-004, 006-441-005, 006-441-034, 009-630-037, and 009-630-039. The Site sits in a valley created by the South Fork of Wolf Creek, and is bordered by Brunswick Road to the east, East Bennett Road and one residential property to the north, minimally developed residential properties upslope to the south and southwest, and undeveloped steeply sloping naturally vegetated terrain to the west.

At the time of our investigation, the Site consisted of generally flat lying surfaces around the abandoned New Brunswick shaft and sawmill landings, gently sloping open fields and tree covered areas extending downstream of the dam, and steep slopes along the southern and western perimeter of the Site. Site topography varied from flat to gently sloping along portions of the developed areas, to steeply sloping in the western and southern portions of the Site. Deep fill was apparent in the vicinity of the New Brunswick Mine workings. We also observed the mine silo, concrete slabs-on-grade, and the covered New Brunswick shaft in this area. The gently sloping surfaces along the valley floor were covered with thick vegetation and we could not evaluate the nature of the material in this area. The South Fork of Wolf Creek is contained within an approximate 48-inch CMP culvert that trends northwest through the center of the Site and discharges back into its natural channel, continuing northwestward along the northwestern border of the property.

4.0 PROPOSED IMPROVEMENTS

We reviewed site plans for the project including a Grading Plan (sheet B-1) prepared by Nevada City Engineering, Inc.; and Infrastructure plan (sheet B101), Biological and Cultural Summary Map (sheet B102), Infrastructure Details (sheet B103) and Section Views (sheet B104) prepared by Rise Grass Valley, Inc. and dated November 2019. Based on our review of these site plans, we understand that the proposed site improvements for the project will likely include the construction of:

- Multiple new light and heavily loaded structures to support industrial mining activities;
- Mitigation of the existing pond dam embankment and liner;
- Retrofitting and expansion of the existing New Brunswick shaft to support industrial mining activities;
- Construction of a new service shaft and headframe to support industrial mining activities;
- Construction of a storm water detention pond;
- Construction of an engineered fill pad for future industrial use; and
- Associated infrastructure elements including retaining structures.

Appurtenant construction will include asphalt concrete paved roads and parking areas, and underground utilities. We anticipate that grading for the project will include cut and fill for building pads, roadways, culvert improvements, dam mitigation, and retaining structures and excavation for underground utilities.

We anticipate that grading for the proposed project will include cut and fill for roadways and engineered fills. In order to achieve the desired grading for the proposed development, existing slopes exceeding 30 percent will be disturbed during grading construction. Due to the proposed development and existing site topography, there is no alternatively feasible location(s) on the subject property that would have less impact on the Site and surrounding areas.

5.0 PURPOSE

We understand that the primary concern is the disturbance of original ground as a result of grading in slope areas exceeding 30 percent, and the potential of sediments and other undesirable materials being discharged into downslope drainages. The purpose of our management plan is to facilitate review and permitting of the proposed improvements within these steep sloped areas, as required by the Nevada County Community Development Agency.

6.0 CONCLUSIONS

The following conclusions and opinions are based on the findings of our site reconnaissance and subsurface investigation, our review of local geologic conditions, and our experience in the area.

1. It is our opinion that the proposed project developments within steep slope areas are generally feasible from a geotechnical engineering standpoint, provided the grading recommendations included herein are incorporated in conjunction with the grading recommendations presented in the Geotechnical Engineering Report for the project dated November 18, 2019.

2. The proposed project development is generally located in areas where natural slope gradients are less than 30 percent. However, isolated and peripheral steep slope areas are incorporated within the limits of the proposed development. No feasible alternatives were identified during design of the proposed project that could avoid these environmentally sensitive resource areas.
3. Areas of steep slopes (exceeding 30 percent) and high erosion potential are considered to be environmentally sensitive resource areas. Our opinion is that project grading activities for the proposed development on the steeply sloping portions of the property will require hillside grading techniques, as well as sediment and erosion control measures, in accordance with industry accepted Best Management Practices (BMP's).
4. In general, no major streams or drainage courses were identified within the limits of the proposed development. The South Fork Wolf Creek that passes through the Site is, and is proposed to remain, contained within a culvert that discharges downslope of the limits of the proposed development. Surface water runoff should be routed to rock-lined V-ditches or cross culverts, where possible, to reduce erosion from concentrated surface water flow.
5. Our primary concern regarding the subject site is the increased potential for erosion when grading is performed on relatively steep slopes. To mitigate the potential for erosion, grading operations on slopes exceeding 30 percent should not be performed when significant precipitation is likely to occur. The locally defined wet season begins on October 15 and ends on April 15 of the following year. Grading work at the Site may continue under fair weather conditions during the wet season, provided the following recommended hillside grading and sediment and erosion control measures are implemented.
6. We anticipate that a storm water pollution prevention plan (SWPPP) will be required for the project. The erosion and sediment control elements, as well as the monitoring requirements, of the SWPPP should be implemented to reduce the likelihood of storm water pollution.
7. Regardless of the erosion control measures in place, some erosion and sediment transport from the graded areas should be anticipated. Sedimentation basins or similar silt removal elements should be constructed to reduce the likelihood of sediment laden storm water from leaving the Site. It should be understood that periodic maintenance may be required to maintain and/or rebuild segments of improvements constructed on steep slopes due to future slope instabilities, erosion and mass wasting.
8. Our experience in the area has shown that slopes steeper than approximately 2:1, horizontal:vertical (H:V), can be difficult to successfully revegetate with standard seed and straw placement. The use of tackifiers, fiber emulsions, jute netting or permanent erosion control mats may be necessary on steeper slopes. If requested, we can provide further recommendations for such mitigation measures.

7.0 RECOMMENDATIONS

The following general geotechnical engineering recommendations are based on our understanding of the project as currently proposed, our observations of surface and subsurface conditions, our literature review, and our experience in the area.

7.1 CLEARING AND GRUBBING

Strip and remove organic surface soil containing shallow vegetation and any other deleterious materials. Vegetation and organic-rich topsoil may be suitable as a mulch but should generally not be used as engineered fill. The depth of stripping may vary across the Site. Vegetation, tree stumps and exposed root systems, and any other deleterious materials not used in landscape areas, should be removed from the Site or used in open space areas.

Overexcavate and remove loose debris and existing fill to underlying, competent material. Remove loose backfill from exploratory trenches, existing roadway fill, mantles or soil test pits, mining excavations, tree stump holes, and other disturbance features.

Remove all rocks greater than 8 inches in greatest dimension (oversized rock) from the top 12 inches of soil. Oversize rock (more than 8 inches in greatest dimension) should generally not be used as engineered fill but may be suitable for use as riprap for slope protection, stacked rock walls or in landscape areas.

7.2 PREPARATION FOR FILL PLACEMENT

Upon completion of site clearing, grubbing and overexcavation, exposed native soil in areas that will receive fill should be observed by a representative of NV5 prior to fill placement. Fill placed on slopes steeper than 5:1, H:V should be benched into the existing slope to allow placement of fill in thin horizontal lifts. Benches should be at least 10 feet wide and should extend a minimum of 2 feet into competent native soil or rock on the down slope edge, as determined by NV5 in the field.

7.3 FILL PLACEMENT

Fill should be placed according to the following guidelines:

Material used for fill construction should consist of uncontaminated, predominantly granular, non-expansive native soil or approved import soil. Imported fill material, if proposed, should be predominantly granular, non-expansive and free of deleterious or organic material. If imported material is selected, a representative sample should be submitted to NV5 for approval and laboratory analysis at least 72 hours prior to use as fill.

Rock used in fill should be no larger than 8 inches in diameter. Oversize rock (more than 8 inches in greatest dimension) should generally not be used as engineered fill but may be suitable for use as rip rap for slope protection, stacked rock walls or in landscape areas. If the fill is to be reinforced with geotextile fabric or geogrid, rock size may be further restricted in the area of fabric placement, as determined by NV5.

Fill should be uniformly moisture conditioned and placed in maximum 8-inch thick loose lifts (layers) prior to compacting. Fill should be compacted to at least 90 percent of the maximum dry density, and the upper 12 inches of fill in hardscape areas should be compacted to a minimum of 95 percent of the maximum dry density per ASTM D1557. The moisture content, density and relative compaction of fill should be evaluated by our firm during construction. Compaction tests are typically performed every 12 to 18 vertical inches of fill.

7.4 CUT/FILL SLOPE GRADING

Based on our observations of soil conditions on the Site, potential cut and fill slopes steeper than 2:1, H:V, will be subject to erosion and raveling and will require routine maintenance. Therefore, cut and fill slopes steeper than 2:1, H:V, are not recommended without the use of rock slope protection, geotextile reinforcement, or retaining walls, as discussed below.

Fill Slope Grading

Steeper fill slope gradients (up to 60° or approximately 2/3:1, H:V) would be feasible with incorporation of soil reinforced structures. Fill slope gradients steeper than 1:1, H:V, would likely require modular block facing or other permanent facing in addition to geotextile reinforcement. As an alternative to rock or block facing, a proprietary retaining system such as Maccaferri Terramesh or Tensar Sierra Scape may be appropriate. If requested, NV5 can provide design and/or consultation assistance in selection and design of cost effective alternative solutions.

Fill should be placed in horizontal lifts to the grades shown on the project plans. Slopes should be constructed by overbuilding the slope face with compacted fill and then cutting it back to the design slope gradient. Fill slopes should not be constructed or extended horizontally by placing soil on an existing slope face and/or compacted by track walking.

Benching must extend through loose surface soil into firm material, and be performed at intervals such that no loose soil is left beneath the fill. An equipment width bench should be made at least every 5 vertical feet. Actual bench intervals should be verified in the field by NV5 based on existing slope gradients.

Cut Slope Grading

Cut slopes steeper than 2:1, H:V, may be feasible with incorporation of rock slope protection, modular block facing or mechanically stabilized earth (MSE) structures. The retention of near-vertical cuts up to approximately six feet tall may be feasible using dry-stacked rock. Taller near-vertical cuts would likely require conventional retaining walls, MSE structures, or tieback systems. If requested, NV5 can provide design and/or consultation assistance in selection and design of cost effective alternative solutions.

7.5 SUBSURFACE DRAINAGE

We anticipate that seepage may be encountered during grading for proposed improvements onsite, particularly in deeper excavations and utility trenches or if grading is attempted during or immediately following the rainy season. We anticipate that dewatering may be possible by gravity or by installation of sump pumps in the excavation. Specific subsurface drainage recommendations can be provided as needed during construction.

7.6 SURFACE WATER DRAINAGE

Proper surface water drainage is important to the successful development of the project. Surface water drainage should not be directed over cut and fill slope faces. The intercepted water should be discharged into natural drainage courses. Ephemeral streams and drainage channels shall be kept clear, and allow surface water to drain.

Culverts should be installed where proposed grading crosses drainage channels and ephemeral streams to reduce the chances of erosion at these locations. Energy dissipaters, such as riprap or splash blocks, should be installed at the culvert inlets and outlets to mitigate erosion of the trail at these crossings.

If cross culverts are to be installed, general guidelines for culvert sizing and installation can be found in the Nevada County Land Use and Development Code, Chapter XVII, Article 5. We can provide specific recommendations on the design of these crossings if needed.

7.7 EROSION CONTROL DURING CONSTRUCTION

Existing vegetation should be preserved to the extent practical, and exposed soil should be protected from wind and water erosion. Graded portions of the Site should be seeded as soon as possible following grading to allow vegetation to become established prior to the rainy season. The following erosion control measures should be implemented for cut and fill slopes to reduce erosion.

Best management practices (BMPs) should be implemented for erosion and sediment control. Typical BMPs, such as seeding, mulch, straw with jute netting, tackifiers, fiber rolls, silt fences, rock/log check dams and sediment traps, should be used during and after construction as needed to reduce erosion and retain sediment at the construction area.

The earthwork contractor should provide labor, materials, and equipment to maintain and protect exposed soil from wind and water erosion. If a storm is forecasted for the area, all exposed fill areas shall be sloped to drain and compacted with a smooth drum roller to facilitate runoff. All existing surface drainage facilities must be kept free of soil and debris during construction. The contractor should provide siltation control and management during construction. All temporary or constructed water conveyance channels should be kept free of sediment or debris at all times. Temporary erosion control should be applied within and adjacent to the boundary of the construction zone. At end of seasonal grading activities, the erosion control devices should remain functional and in place to provide erosion control protection into the winter.

7.8 GRADING PLAN REVIEW & CONSTRUCTION MONITORING

Construction quality assurance includes review of plans and specifications and performing construction monitoring as described below.

1. NV5 should be retained to review the final grading plans prior to construction to confirm our understanding of the project at the time of our investigation, to determine whether our recommendations have been implemented, and to provide additional and/or modified recommendations, if necessary.
2. We recommend holding a preconstruction site meeting with the client, general contractor and all subcontractors involved with site grading, underground utility, and foundation construction to review and discuss the geotechnical related aspects of the project and establish a protocol for addressing geotechnical issues during construction of the project.
3. NV5 should be retained to perform construction quality assurance (CQA) monitoring of all earthwork grading performed by the contractor to determine whether our recommendations have been implemented, and if necessary, provide additional and/or modified recommendations. Special inspection and testing services should be requested by the owner or project general contractor, as required by the Structural Engineer and requirements of the local applicable building code.

8.0 LIMITATIONS

Our professional services were performed consistent with the generally accepted geotechnical engineering principles and practices employed in northern California. No warranty, expressed or implied, is made or intended in connection with our work.

Pre-existing soil conditions and/or substandard construction may cause future drainage issues at the Site. We can assume no responsibility for the future performance of trail or drainage improvements.

Our scope of services did not include an evaluation of the Site for the presence of hazardous materials. Although we did not observe the presence of hazardous materials at the time of our field investigation, all project personnel should be careful and take the necessary precautions should hazardous materials be encountered during construction.

These services were performed consistent with NV5's agreement with our client. We are not responsible for the impacts of any changes in standards, practices, or regulations subsequent to performance of our services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this report. This report is solely for the use of our client unless noted otherwise. Any reliance on this report by a third party is at the party's sole risk.

The findings of this report are valid as of the present date. Changes in the conditions of the property can occur with the passage of time. The changes may be due to natural processes or to the works of man, on the subject site or adjacent properties. If changes are made to the nature or design of the project as described in this report, then the conclusions and recommendations presented in this report should be considered invalid by all parties. Only our firm can determine the validity of the conclusions and recommendations presented in this report. Therefore, we should be allowed to review all project changes and prepare written responses with regards to their impacts on our conclusions and recommendations. The recommendations presented in this report should not be relied upon after a period of two years from the issue date without our review.