

North Star Water Treatment Project Description

The North Star Water Treatment Project (Project) consists of proposed facilities to collect, convey, and treat water currently draining from three mine features and a spring near Grass Valley, Nevada County, California (see Site Plan) as required by the California Regional Water Quality Control Board, Central Valley Region, Cleanup and Abatement Order R5-2014-0706 (attached). The mine drainage features are associated with former gold mines that operated from the mid-1800's to the mid-1900's. Following closure of the mines, groundwater levels (elevations) within the underground mine workings recovered and currently drain by gravity from the mine features.

Two of the mine drainage features, referred to as the Adit and Pipe Culvert, and an adjacent spring are located on the North Star Property east of Allison Ranch Road and west of Wolf Creek. Water from these two mine features currently drains to Wolf Creek. The North Star Property is owned and controlled by Newmont USA, Ltd. (Newmont). The two mine drainage features are located on Nevada County Land parcel 29-350-16, which is subject to a conservation easement managed by the Bear Yuba Land Trust. The spring is located on the adjoining Nevada County Land parcel 22-120-28.

The third mine feature is the Drew Tunnel, which is a drainage tunnel from the Massachusetts Hill Mine. The Drew Tunnel portal is located within Nevada County Land parcel 29-290-26 at the City of Grass Valley Waste Water Treatment Plant (WWTP). Water draining from the Drew Tunnel is currently collected and treated temporarily by Newmont at the WWTP, pursuant to a Limited Threat General Waste Discharge Requirement Order National Pollutant Discharge Elimination System (NPDES) permit issued to Newmont by the Central Valley Regional Water Quality Control Board (Regional Board). Under an agreement with the City, Newmont will purchase a portion of property from the WWTP parcel necessary to collect and convey the Drew Tunnel water for treatment at the proposed Project.

Comprehensive water quality and flow monitoring of the drainage features have been conducted. The results identify that the primary constituents requiring treatment are naturally occurring iron and manganese derived from the underground mine workings. The treatment process will remove iron and manganese to concentrations that are below the NPDES permitted effluent limitations. Based on monitoring conducted to date, the average combined flow of all the drainage features is approximately 720 gallons per minute (gpm) and the maximum combined flow is approximately 1,970 gpm.

Water from the drainage features will be collected and conveyed to the Project's passive treatment facility. A pump station will be constructed adjacent to the Drew Tunnel below Allison Ranch Road to collect the water. A pumping well will be constructed for the drainage features on the North Star Property. The purpose of the pumping well will be to hydraulically collect and control the water from the North Star drainage features. Turbine pumps will be installed at both pump stations. Standby electrical generators will be located at both pump stations for emergency backup electrical power, and would be periodically exercised for a minimum operating period as recommended by the generator manufacturer. Exercising periods will be for minimum time periods (minutes to hours) during daylight periods to lubricate and test mechanical and electrical components. Groundwater collected from these pump systems will be conveyed by piping to the passive treatment facility. The pipeline will extend from the Drew Tunnel collection system to the south along Allison Ranch Road, continue on the Allison Ranch Road bypass segment south, and then east on an existing access road on North Star Property. The pipeline will merge with the pipeline conveying water from the North Star pumping system and continue to the proposed passive treatment facility area.

The proposed location of the treatment facility is on the North Star Property in Nevada County Land parcel 22-160-27. The proposed treatment technology is a passive treatment system with three components. The treatment components will include:

- Sedimentation pond(s),
- Treatment wetland pond, and
- Oxidic limestone beds.

The passive treatment system components will be constructed to create a gravity flow system from the conveyance piping to the discharge point of the treatment facility. The passive treatment system is sized to treat the combined flow of the drainages. Water will be released from the conveyance piping to sedimentation pond(s), which will be designed to provide for a 24-hour hydraulic retention time to allow the inert suspended solids and iron hydroxide to settle out of solution. Precipitation of solids in the sedimentation ponds will prolong the life cycle of the wetland cell(s) and facilitate residual solids management. Water will be routed from the sedimentation pond(s) to a wetland. Aerobic wetlands treatment is a proven technology for the treatment of net-alkaline, iron rich waters. Four processes function to remove iron and other metals in surface wetlands, including:

- Settlement of precipitated solids from aqueous solution,
- Physical filtration of colloidal precipitates by plant stalks etc.,
- Formation of hydroxide/oxide plaques on plant roots and rhizomes, and
- Sorption and in-situ oxidation.

The wetland pond is expected to occupy an area of about 2.5 acres based on results of pilot-scale passive treatability testing. The wetland pond is designed with a lined base and approximately 24 inches of growing material (soil), and will be planted with common rush, irisleaf rush, and small fruited bulrush (*Juncus effuses*, *Juncus xiphioides*, *Scirpus microcarpus*) or similar wetland species. The pond will maintain approximately 3-8 inches of water above the substrate surface. From the wetland, water will flow to an oxic limestone bed constructed to maximize water aeration via channel cascades and pH adjustment provided by the limestone to facilitate removal of residual manganese. The treated water will be released to Wolf Creek under a Limited Threat NPDES permit. Periodic monitoring will be performed to assure that the effluent meets the permit limits.

Existing trees surrounding the perimeter of the proposed construction areas will be left in place to provide natural screening of the features from Allison Ranch Road and neighbors. After construction is completed, little to no noise is expected from the treatment facilities, as they are designed to operate by gravity flow, with flowing water being the only moving component. Periodic inspections will be necessary and will involve one or two personnel walking the site, inspecting the facilities and collecting water samples during normal business hours.

The water collection, conveyance, and treatment facilities will be subject to permits issued by the Regional Board, Nevada County, City of Grass Valley, and potentially other state agencies. An agreement with the Bear Yuba Land Trust will be required for the collection and conveyance of waters within and across the conservation easement. The project will require compliance with the California Environmental Quality Act (CEQA). The water quality of the effluent from the treatment facility will be subject to a Limited Threat NPDES permit issued by the Regional Board. The collection, conveyance, and treatment facilities will be owned and operated by Newmont.