

ERDENES SILVER RESOURCE SALKHIT MINE CLOSURE PLAN PILOT

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CHALLENGES TO BIOLOGICAL RECLAMATION IN THE EASTERN GOBI DESERT STEPPE ECOREGION

ENVIRONMENTAL CHALLENGES

A goal of the Salkhit Mine Closure Plan (MCP) is “reclaimed sites exhibit characteristics and functions close to the natural ecosystem state, that support traditional land use type for local communities”. Dundgobi Aimag, in which the Salkhit mine operates, is located on the border of the eastern Gobi Desert steppe.

The ecoregion has an arid continental climate, with harsh, cold winters and warm to hot summers. Wind is the primary cause of erosion in the eastern Gobi Desert steppe ecoregion. In the last 20 years, the occurrence of strong winds and dust storms has increased (Badamsuren, 2022). Recent historical temperature analysis shows a shift to a slightly warmer climate, particularly for summer seasons. Precipitation data showed that summer precipitation has decreased substantially (almost 1 mm/year) resulting in a slight decrease in annual precipitation.

Soils on the Salkhit mine site are typically low in carbon content and have poor fertility. Wind erosion causes the fine soil particles to blow away leaving coarse sand and small pebbles. This makes it challenging for plants to grow. Land uses such as mining, in which native vegetation and soil is removed, are particularly challenging to reclaim in this ecoregion.

This article describes the biological reclamation techniques and research trials proposed in the MCP, designed to mitigate the challenges, and set the reclaimed mine on the trajectory towards achieving the goal of a self-sustaining ecosystem.

BIOLOGICAL RECLAMATION TECHNIQUES AND MITIGATION MEASURES

Soil stripping and stockpiling

Due to the scarcity of fertile topsoil, stripping and storing the topsoil into piles or windrows before mining is critical, so the soil is available for biological reclamation of the mine. Erosion of stockpiled topsoil is mitigated by seeding stockpiles with native grasses and legumes and orienting stockpiles and windrows to minimize exposure to the wind.

Soil placement and amendments

After the construction of a closure landform, sufficient topsoil is placed to provide a suitable growing medium for plants. For the Salkhit Mine, the planned soil placement thickness ranges between 15 cm and 30 cm, depending on the requirements of the type of plants to be established. In areas where there is insufficient topsoil, additional organic material (animal manure), will be incorporated, to provide a growing medium and nutrients for the plants.

Soil erosion from closure landforms is an issue which requires monitoring and mitigation. Techniques to mitigate erosion are detailed in the Salkhit MCP.

Revegetation

The primary target post-mining land use is grazing. Planting a diversity of native species has multiple benefits of supporting livestock grazing, mitigating erosion, providing wildlife habitat, and contributing to biological diversity. Another benefit of planting a diversity of species is that under the effects of climate change, different species have a variety of adaptation mechanisms.

Vegetation communities are planned for different landforms at the mine, because of the different site conditions (i.e.: slope, aspect, moisture). The revegetation communities are as follows:

Revegetation community	Landforms
<i>Caragana microphylla</i> , <i>Caragana pygmaea</i> and Siberian elm (<i>Ulmus pumila</i>) to form a natural barrier	Edge of Mine Pit
Perennial grass and legumes seed mix*	Slope surface of open pit, mining roads, camp
Couch grass (<i>Elytrigia</i>), wild rye (<i>Elymus</i>), Russian wild rye <i>Psathyrostachys</i> common reed (<i>Pragmites communis</i>)	Watershed berm at the open pit waterline
<i>Caragana microphylla</i> , <i>Caragana pygmaea</i>	Waste rock dumps
Perennial grass and legumes seed mix*, <i>Allium polyrhizum</i> , <i>Caragana microphylla</i> , <i>Caragana pygmaea</i>	Concentration plant, fuel station and maintenance area,
Perennial grass and legumes seed mix*, <i>Ajania</i> , <i>Caragana microphylla</i> , <i>Caragana pygmaea</i>	Explosives area

*Species list available upon request. Certain traditional and medicinal plants will be included.

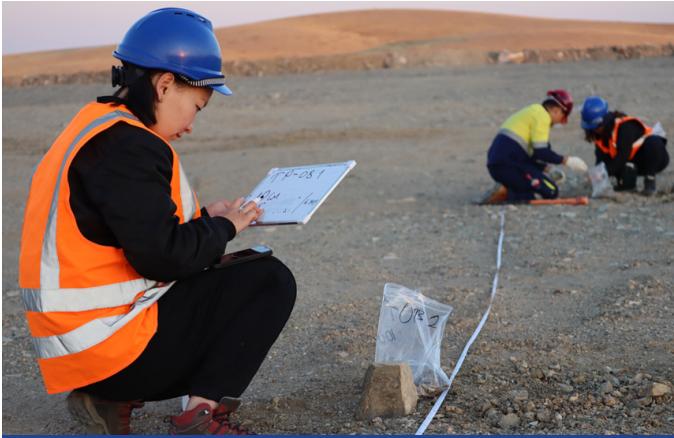


Figure 1. Field study of Environmental consultant team at the Salkhit Mine

RECLAMATION MONITORING, REVEGETATION RESEARCH, AND ADAPTIVE MANAGEMENT

Monitoring the condition of the reclaimed landforms and biological reclamation (soils and vegetation) is critical to determining whether the site is on trajectory to meeting the reclamation goal of creating a natural ecosystem. The Salkhit MCP post-closure monitoring framework includes indicators designed to monitor soil quality, revegetation progress, and vegetation productivity.

Revegetation research trials are planned for the Salkhit Mine. Research trials are separate from the reclamation closure monitoring program. The research program is designed to answer specific questions about managing risks or understanding the best techniques by which to implement the reclamation work. Two revegetation research trials are proposed.

Trial type	Description
Seed Collection and Growing	Researching seed collection and growing techniques of various plant species improves reclamation practitioners' understanding of these topics. This provides confidence that seed is collected only for suitable plants intended for reclamation use and that those seeds can be grown with a high degree of success.
Seeding Rates	MNS 5918:2008 standard for seeding rates provides a range from 10 to 20 kg of seed per hectare. This range is too wide, especially considering the cost of seed collection, handling and seeding. Research is required to determine the most efficient rate of application and seed mixture ratios of the selected reclamation plant species.

The data from monitoring and research can be used to adapt the biological reclamation techniques, for example, to adjust soil preparation techniques, modification of planting densities or use of different technologies. Adaptive management is especially important under the uncertainties of climate change.

References: Badamsuren, E. (2022). [Climate condition of the last 20 years in Dundgovi aimag]

ROLES AND RESPONSIBILITIES FOR SOCIO-ECONOMIC TRANSITION

The socio-economic transition in mine closure is a critical aspect that requires active commitment from mining companies, strong support and leadership from government organizations, and collaboration among various stakeholders.

Erdenes Silver Resource LLC (ESR), as a state-owned mining company, aims to contribute to responsible mining industry development. Despite limited capabilities and authority, the company shares the responsibility for driving regional development goals. ESR prioritizes the development and implementation of the socio-economic transition plan to mitigate impacts on community members, workers, and the environment. These efforts work to build trust, ensure accountability, and enable adaptive management based on feedback from community members, including women's voices and perspectives.

It is critical that the government provides the necessary regulatory framework, policies, and incentives to enforce environmental and social standards for mining companies during the closure process.



Figure 2. Socio-Economic consultant booth to provide information during the Community Engagement Session II

Specifically, provincial and district governments play a crucial role in facilitating the socio-economic transition of communities impacted by mine closures. The Dundgobi provincial government provides leadership, working closely with local communities to identify and develop viable alternative economic opportunities. This could involve promoting tourism, agriculture, or other sustainable initiatives that align with the region's resources and strengths.

Gurvansaikhan's district government facilitates a community-based monitoring mechanism to ensure the effective implementation of Salkhit Silver Mine closure management plan. This involvement not only helps ensure legal compliance but also creates a sense of ownership and responsibility among local government and community members.

By implementing these recommendations, ESR and government organizations at all levels enhance the overall effectiveness of the mine closure and transition process, fostering comprehensive and inclusive outcomes for impacted communities and the environment.

CONTACT INFORMATION

Merit aims to provide engaging and relevant content on the Salkhit mine closure plan project. We value our stakeholders feedback and would like to hear from you on how we can improve our newsletter.

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