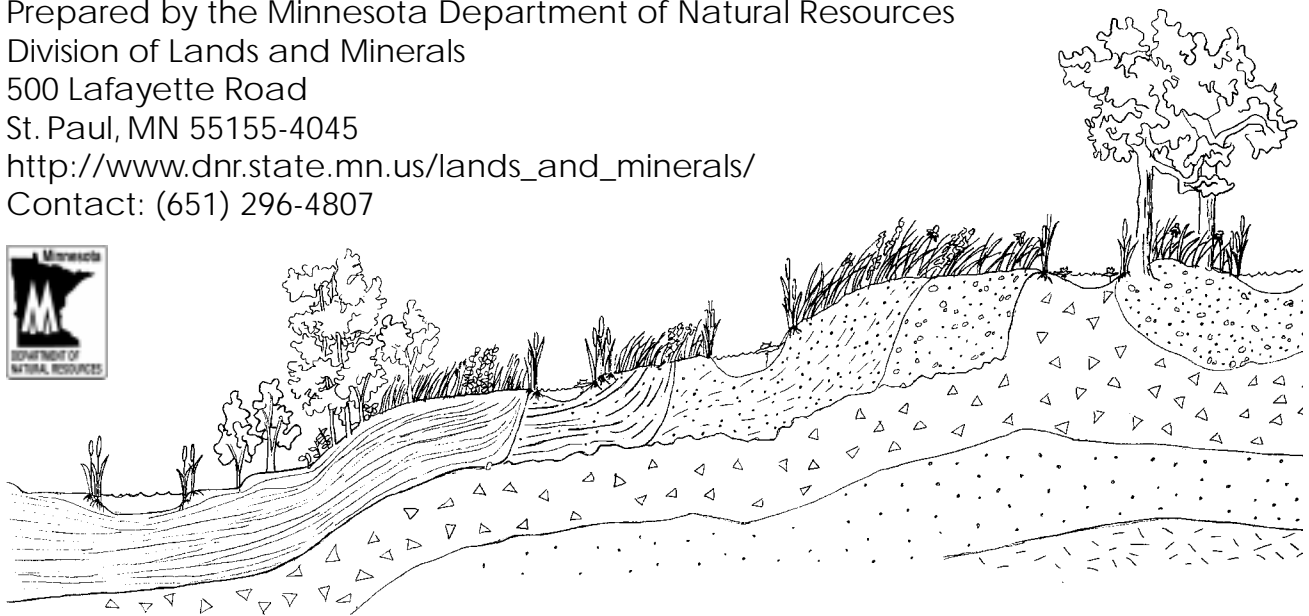


# Mining Plans for Aggregate Operations

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## WHAT IS A MINING PLAN?

A mining plan is a combination of maps and written information that describes every aspect of the proposed operation from inventory of the gravel resource to post-mining management of the site. The mining plan describes activities to be conducted at the mine site over the life of the operation. A mining plan is prepared before mining begins, often as a requirement for a permit.

The purpose of a mining plan is to ensure environmentally sound mining, including leaving the area in a safe, nonpolluting condition, and preserving as much land value as possible. A mining plan may consider view, noise, dust, hours of operation, traffic, final reclamation, and many other concerns. The requirements and provisions of plans vary with the local authority.

Because there is market fluctuation in the aggregate industry, the mining plan must be sufficiently flexible to accommodate such changes. The plan should be updated to reflect operating plan changes. Many operating permits also require updates. A mining plan ensures that activities progress according to a general concept that includes site reclamation.

A mining plan aids the cost efficiency and minimizes the environmental impact of the site. It allows for early identification of environmental concerns, efficient removal of the aggregate, and cost-effective reclamation. Through planning, materials can be placed in the appropriate location during stripping operations. Areas requiring fill material can be identified. Final landforms can be constructed during active mining.

## ARE MINING PLANS REQUIRED FOR AGGREGATE OPERATIONS?

Currently, there is no state or federal mining permit in Minnesota that requires aggregate operators to submit a mining plan or to reclaim the site after mining. Aggregate mining operations are

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reviewed at the local unit of government—county, township or municipality, not at the state or federal level. Zoning ordinances and land use planning are employed to control mining operations. The local permits frequently address view, noise, dust, hours of operation, traffic, and final reclamation. Increasingly, local aggregate operation permits require a mining plan.

### ***WHAT INFORMATION IS INCLUDED IN A MINING PLAN?***

A mining plan is geared to the size and scope of the project. Small projects generally will require a simpler plan; larger operations will need a more elaborate one. Aggregate mining operations share certain characteristics, but each one is unique and needs a mining plan tailored to its site. The information needed for a mining plan generally includes the following:

Inventory of the aggregate resource including the shape, extent and depth of the aggregate deposit and its relationship to the groundwater.

General knowledge of the aggregate deposit is important. The best available information about the deposit must be collected from water well logs, existing surveys or maps, and previous testing work in the area. The most complete inventory data is obtained from drilling or test pitting on the site, but such data is not always available or necessary. Additional site specific work may be needed.

Characteristics of the deposit will determine in part the layout of the mine, the sequence for mine development, and the plan for how to blend the various aggregate materials to meet specifications. Economic considerations likely to influence the rate of mining should also be discussed in the plan, such as the thickness of the overburden, the quality of the aggregate, and haul distance.

#### **Assessment of pre-mining conditions, including current land uses, ownership, infrastructure, previous excavations, existing vegetation and water features among others**

An “assessment of pre-mining conditions” describes the setting before mining begins. This may include, among other things: the direction of flow in surface waters; the depth to and direction of groundwater flow; location of buildings and other infrastructure (roads, wells), existing land uses, presence of endangered species and cultural resources. An assessment can identify and mitigate environmental problems and public concerns associated with the project.

#### **Description of mining methods including processing methods**

A description of mining methods addresses how the resource will be mined and processed, and describes any proposed mitigation measures. This could include proposed operation hours, how complaints will be addressed, specific erosion control measures to be used, or how screening will be utilized.

#### **Discussion on the staging and sequencing of operations**

This discussion is closely linked with the above and is directed at how the mining operation will develop over time. Some mining operations remove the resource in several discreet stages over a short period of time, and others mine it in one stage for a longer period of time. The staging of operations has implications for reclamation. Can reclamation be accomplished progressively throughout the operation or is it best accomplished at the end of active mining?



### **Proposed reclamation, schedule, and post-mining management**

Proposed reclamation describes the intended end uses of the site. Reclamation can consist of simply stabilizing slopes or it can include steps to restore wildlife habitats or preparation of the land for residential construction. When an operator has an end use goal in mind, mining activities like clearing, stripping, stockpiling, and landform construction can be directed toward the planned reclamation throughout the mining phase.

### ***WHAT DOES A MINING PLAN LOOK LIKE?***

Mining plans typically employ maps, an effective way to convey the needed information. The vicinity of a proposed operation is often shown on a topographic quadrangle map at a scale of 1:24,000. Specifics of the plan for mining the site are most often depicted on a more detailed plan view map. Proposed features of the mining operations (such as stripping areas, cuts, excavations, processing facilities, roads, stockpiles, ditches, berms, water control structures, etc.) and reclamation features (screened areas, areas to be revegetated, final slopes and grades, etc.) can be depicted on the detailed map. Vertical details are shown with contour lines and cross sections. A series of sequential maps can illustrate how operations will proceed over time. A base map with overlays can effectively show the proposed stages of the operation

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