

INSTRUCTIONS FOR FORM SM-8A

APPLICATION FOR RECLAMATION PERMIT

YOU NEED A RECLAMATION PERMIT IF YOU:

Have disturbed or plan to disturb more than three acres

You must file a reclamation plan for mines in which three or more acres (including highwalls, pit floors, stockpiled areas, side-cast areas, and processing-plant sites) will be or have been disturbed by mining.

Have a mine with working faces higher than 30 feet and steeper than 45°

You must file a reclamation plan for mines with working faces that are both higher than 30 feet and steeper than 1 foot horizontal to 1 foot vertical (45°), unless there is a pre-existing natural hazard in the area.

This form will help you by providing a checklist of the information required. Even so, it is not uncommon for

applicants to have to modify their original plan before it is acceptable to the Department.

Suggestion: Contact the appropriate region office to arrange a meeting to discuss the mining proposal before you proceed with the application. This will facilitate the application process for both you and the State.

Note: When signed by the applicant and approved by the Department of Natural Resources, the application document and the associated maps, cross sections, and other attachments will be the approved reclamation plan for this permit that the permit holder must follow for the mine site. Variation from the approved reclamation plan may require that a new plan be submitted to the Department for approval.

PLANNING FOR RECLAMATION

Reclamation of a site must meet or exceed the standards required by the Washington State Surface Mining Act (RCW 78.44). The primary purpose of the Act is to insure that segmental reclamation occurs promptly and properly for all permitted mines. *Best Management Practices for Reclaiming Surface Mines in Washington and Oregon*, Washington Division of Geology and Earth Resources Open File Report 96-2, provides information on what is needed to reclaim a site. Each requirement of the reclamation law may not fit every mine. The law provides some latitude for variance. If you have a good reclamation idea or a unique operating problem, see the reclamation specialist at your Department of Natural Resources Region office.

WHAT IS A RECLAMATION PLAN?

A reclamation plan can be thought of as both a financial planning document and a contract that defines the topography, drainage, and vegetation of the site after reclamation is complete. This plan describes the permit holder's strategy to achieve acceptable reclamation at the lowest possible cost and establishes an economic limit of production for each site, based on the area available for mining and the grade of the deposit. It also identifies and addresses mitigation of potential environmental impacts,

such as gullyng of impermeable clays, for which the permit holder is liable; establishes a segmental sequence of mining and reclamation that will avoid unnecessary earth moving; and identifies equipment needed. The plan should provide a schedule for initiating reclamation as soon as possible on parts of the site where surface mining has been completed. Reclamation activities, to the extent feasible, should be conducted simultaneously with surface mining, and, in any case, reclamation must be completed on any segment within two years of abandonment of mining on that segment (except as provided for in a segmental reclamation agreement). A reclamation plan should be simple, practical, and easy to implement. It should be flexible, taking into account the potential for unanticipated changes in the geology and the market that will affect reclamation. The plan should have provisions for quality reclamation, even if mining to depletion never occurs. The required maps, cross sections, and written narrative (RCW 78.44.091) are adequate documentation for most mines. In some instances, separate reports, such as an expanded checklist, hydrogeologic evaluation, slope stability analysis, or environmental impact statement, may be necessary. The checklist below will help you be sure that nothing is forgotten.

GENERAL INSTRUCTIONS

USING THE WORD TEMPLATE

This version of Form SM-8A was designed to work with Microsoft Word 1997 to 2007. To make the template easy to follow and use on screen, most of the explanatory notes formerly on the printed version were removed and placed in this document. The section numbers in this document correspond to the numbers in the template. Careful review of this document is strongly recommended prior to completing the SM-8A.

The text of SM-8A is locked so that the questions cannot be changed. The gray rectangles are 'live' areas where you can type in your answers. Check the appropriate boxes and fill in the blanks. You can navigate the form using the mouse, the Tab key, or the direction keys. You can 'check' boxes by clicking with the mouse or hitting the space bar. The form will expand a reasonable amount to accommodate your answers. (Space on the first page, however, is limited because of the two-column format. If it wraps to the second

page, you will need to go back and shorten some of your answers.)

Where required, explain in the space provided. If the question does not apply to your mine, enter "NA" for "not applicable" to let us know you have read the question. Any unanswered questions may result in this form being returned to you unapproved. If your answer is longer than a few paragraphs, enter "(Continued)" in the blank and restate the question and continue your answer on a separate sheet, or enter "See attached report" in the blank and attach a report. A written narrative that describes the details of the mining and reclamation of the permit area may also be attached.

You do not have to fill out the entire form at one time. Simply save the partially completed form as a normal Word file. When you next open the file, you will have to tab through the boxes you have already filled out to reach the point at which you left off.

APPLICATION FOR RECLAMATION PERMIT

Note: Approval of the reclamation plan and (or) Form SM-6 does not vest the subsequent land use. Subsequent use may be changed by the permit holder with the written approval of local government up until the time reclamation is complete and the reclamation permit is terminated. Change of subsequent use by the permit holder may require submission of a revised Form SM-6, plans, and State Environmental Policy Act (SEPA) checklist.

The information to be entered on page 1 of the template is self-explanatory. However, some thought about the entries on this page will assist the Department's record keeping

functions. For example, the name and address supplied in Boxes 1 and 2 should be consistent with the name(s) used on other reclamation permits, and be consistent with the name(s) used on other forms and documents that may become part of the permit file. If you wish to have billing notices sent to a different name and/or address from the general correspondence, please provide that name in a cover letter or under separate cover. The various questions related to acreages, depths, and elevations should be completed carefully to avoid later confusion and uncertainty, and should be checked against the maps and cross sections for consistency.

CHECKLIST OF RECLAMATION STANDARDS

22. SEGMENTAL RECLAMATION

The permit holder must reclaim each segment of the mine within two years of completing mining on that segment and (or) in the manner described in this reclamation plan or a separate segmental reclamation agreement. Segmental reclamation helps establish self-sustaining vegetation, especially native pioneer vegetation, and promotes stable slope conditions and improves the water quality and appearance of the site. If segmental reclamation does not make sense for your site, explain why.

23. SITE PREPARATION

23A. PERMIT AND DISTURBED AREA BOUNDARIES

The permit holder should delineate the permit boundaries and maximum extent of disturbance and setbacks with clearly

visible permanent boundary markers. The permit holder must maintain the boundary markers until termination of the reclamation permit.

23B. SAVING TOPSOIL, SUBSOIL, AND OVERBURDEN FOR RECLAMATION

Prior to any surface mining operation in any segment, the permit holder shall carefully stockpile all available topsoil, subsoil, and overburden in stable storage areas for use in later reclamation or immediately move them to reclaim adjacent depleted segments. Topsoil and subsoil needed for reclamation may not be sold or given away or removed or mixed with sterile soils. Topsoil and subsoil should not be used for screening berms required by county or municipal government because this would preclude its timely use for reclamation.

23C. SETBACKS AND SCREENS

Setbacks and screens help control erosion, provide seed sources for reclamation, insure that sufficient materials are available for reclamation, and protect adjacent land and resources. They should consist of native vegetation and (or) topography. Setbacks are measured from the permit boundary. The minimum setback for mines in consolidated materials permitted after June 30, 1993, is 30 feet or as determined by the Department. The setback for mines in unconsolidated materials permitted after June 30, 1993, must be equal to the maximum anticipated height of the adjacent working face, or as determined by the Department. (A setback equal to the height of the working face will provide only enough material for a 2 *horizontal*:1 *vertical* or 2:1 slope. To meet the standards of the law, slopes between 2:1 and 3:1 are necessary.)

An exemption from this section may be granted by the Department following a written request that submits an acceptable backfilling plan, geotechnical slope-stability study, proof of a dedicated source of fill materials, written approval of contiguous landowners, and (or) other information. Setbacks and (or) buffers required by other agencies with jurisdiction may be used to satisfy these requirements with Departmental approval. Retain your calculations of the setback to show that you have retained adequate materials for reclamation.

23D. BUFFERS TO PROTECT STREAMS AND FLOOD PLAINS

Generally no mine may be located in or near a stream or on a 100-year flood plain unless a Shoreline Permit has been issued. (See Chapter 173-18, Washington Administrative Code [WAC], for a partial list of streams under Shoreline Management Act jurisdiction.) Buffers from streams and flood plains should be at least 200 feet wide. Wider buffers may be necessary to satisfy designated critical area requirements under the Growth Management Act or for stream, slope, and flood plain stability and to prevent breaching of the pit at a later date.

If the mine is in a river or stream channel or on the 100-year flood plain, you will need to complete “Additional Requirements for Mines in Flood Plains,” which is provided at the end of this document. This information is part of the application for a reclamation permit.

23E. CONSERVATION BUFFERS

In special cases, buffers may be necessary to protect unstable slopes, wildlife habitat, or other sensitive areas or to limit turbid water discharge from areas that will be disturbed.

You may need to complete “Additional Requirements for Mines with Steep or Potentially Unstable Slopes”, which is

included at the end of this document. This information is part of the application for a reclamation permit.

23F. GROUND WATER

If mining is proposed on a flood plain or in an area where ground water resources may be impacted, the mining plan should include a complete environmental analysis (RCW 78.44. 091) of the affected reaches of the river system or aquifers.

If any of the above conditions apply, a ground water study is necessary, and you will need to complete “Additional Requirements for Hydrologically Sensitive Areas”, which is included at the end of this document. This information is part of the application for a reclamation permit.

23G. ARCHEOLOGY

The answer to this question should be based on an opinion from a recognized authority if any uncertainty exists.

24. MINING PRACTICES TO FACILITATE RECLAMATION

24A. SOIL REPLACEMENT

Soil replacement is critical to reclamation. Without soil, vegetation cannot be established. In Washington, topsoil is defined in the reclamation law (RCW 78.44) as the “naturally occurring upper part of a soil profile, including the soil horizon that is rich in humus and capable of supporting vegetation, together with other sediments within four vertical feet of the ground surface.” The upper part of the soil profile should be stored and replaced separately from the lower subsoils or sediments. Use narrative to describe method and timing of topsoil salvage and redistribution.

24B. REMOVAL OF VEGETATION

In a well-planned operation, vegetation is removed from areas to be mined only as needed and is preserved when possible to screen the site and limit erosion that may result in turbid water discharge. Wood and other organic debris should not be buried; it should be recycled or chipped for mulch. If wood and other organic debris will be buried, solid-waste disposal and land-use permits must be obtained.

24C. EROSION CONTROL FOR RECLAMATION

Erosion control measures are generally necessary during mining and reclamation to avoid severe erosion or loss of topsoil. **Each site must be evaluated on an individual basis.** Multiple techniques may be necessary. *Note:* The Department of Ecology requires discharge permits for most surface mines. In addition, some mines at higher elevations should plan for the effects of rain-on-snow events on slope stability and erosion. Implementation of BMPs as described in Best Management Practices for Reclaiming Surface Mines in

Washington and Oregon ([OFR 96-2](#)) can minimize or eliminate erosion and soil loss during reclamation.

25. RECLAMATION TOPOGRAPHY

The goal of reclamation is to create stable, usable land. New drainages should be established, and contours should blend with adjacent offsite topography. To promote slope stability and revegetation, slopes should generally vary between 2 and 3 feet horizontal to 1 foot vertical or flatter. Slopes steeper than 2 feet horizontal to 1 foot vertical are not acceptable for pits except in limited areas to tie into offsite topography. The reclaimed mine site should appear natural—that is, slopes should be sinuous and right-angle corners should be eliminated by rounding. Sinuous slopes can be formed either by mining to the prescribed angles, which is generally more cost effective, or by using the cut-and-fill method. Backfilling is not allowed unless prior approval is obtained from DNR and copies of any other necessary permits are submitted.

You may need to complete “Additional Requirements for Mines with Steep or Potentially Unstable Slopes”, which is included at the end of this document. This information is part of the application for a reclamation permit.

25A. FINAL SLOPES

The answers to these questions are straight forward. Please provide complete explanations of the procedures to be used in the appropriate box.

25B. SLOPE REQUIREMENTS FOR PITS AND OVERBURDEN/ WASTE ROCK DUMPS (NON-SALEABLE PRODUCTS)

The answers to these questions are straight forward.

25C. SLOPE REQUIREMENTS FOR QUARRIES AND HARDROCK METAL MINES

For consolidated rock, such as basalt, andesite, granite, limestone, or quartzite, a vertical highwall face may be acceptable. In all cases, slopes must be stable. Where a severely hazardous condition is created by mining and that condition is not indigenous to the area, the slopes shall not exceed 2 feet horizontal to 1 foot vertical.

25D. BACKFILLING

If backfilling is proposed, it is necessary to give the source of the backfill material, quantity needed, grading and compaction scheme, erosion control plan, and immediate vegetation plan. If backfill is to be brought from off site, copies of all permits from local government will be necessary.

25E. MINE FLOORS

The answers to these questions are straight forward.

25F. LAKES, PONDS, AND WETLANDS

Surface mining that results in the formation of a swamp, pond, or lake may offer the opportunity to create recreation areas, wildlife habitat, water quality controls, or other beneficial wetland purposes. See [Open File Report 96-2](#) for more information of developing these opportunities.

25G. FINAL DRAINAGE CONFIGURATION

Reconstructed drainages must be graded and contain enough energy-dissipation devices so that essentially natural conditions of water velocity, volume, and turbidity are re-established within six months of reclamation of each mine segment. Drainage design may require that runoff volumes be calculated for unvegetated conditions.

26. SITE CLEANUP AND PREPARATION FOR REVEGETATION

26A. DEALING WITH HAZARDOUS MATERIALS

If surface mining will expose hazardous natural materials, such as acid-forming coals and metalliferous rock or soil, the permit holder must attach a plan to handle such materials. All grading and backfilling to cover the hazardous materials must be made with non-noxious, noncombustible, and relatively noncompactable solids unless the permit holder provides written approval from all appropriate solid waste regulatory agencies. Other methods may also be acceptable.

26B. REMOVAL OF DEBRIS

The answer to this question is straight forward.

27. REVEGETATION

The revegetation plan should show how, when, where, and what vegetation will be planted. A thorough and detailed plan increases the chances that plants are well established when reclamation is finished. It is best to do test and demonstration plantings early and to monitor the results so that appropriate changes can be made before mining ceases.

27A. RECOMMENDED PIONEER SPECIES

Segmental reclamation allows plant communities to develop according to ecological succession stages. A combination of natural reseeding and intentional planting is the most effective means of establishing diverse and prosperous pioneer vegetation. Revegetation with grass and legumes should occur during the first appropriate season after slope shaping and replacement of topsoil. Establishing widespread healthy vegetation generally takes several seasons. Follow-up evaluations may be necessary to monitor progress and to determine why plants did not thrive.

In eastern Washington, continuous ground cover may not be achievable because of arid conditions or sparse topsoil. However, revegetation shall be as continuous as reasonably possible.

Mined sites generally present harsh conditions that hamper revegetation. Nevertheless, much can be done to increase the chances for successful seeding and planting.

ATTACHED MAPS

Information about your proposed reclamation plan should be provided on several types of maps: (1) site access shown on a U.S. Geological Survey 7.5-minute quadrangle, (2) a pre-mining topographic map, (3) a reclamation sequence map, and (4) a final reclamation map with at least two intersecting cross sections that extend past the permit boundaries. These maps and cross sections should be at an appropriate scale to show the desired information. Preferred map size is 11 x 17 inches unless otherwise noted; larger maps are acceptable, but you must be prepared to furnish additional copies, if requested. If maps are small, they may be grouped together on a single sheet of paper. The maps should be dated, and the name of the person making the map should be shown in the legend.

For base maps, use U.S. Geological Survey 7.5-minute topographic quadrangle maps, which are available from sporting goods stores or may be downloaded or ordered from the U.S. Geological Survey at <http://topomaps.usgs.gov/> or 1-888-ASK-USGS (1-888-275-8747), select Option 1. Digital 7.5-minute quadrangles are also available online from the University of Washington at <http://duff.geology.washington.edu/data/raster/drg/index.html>.

SUGGESTED MAP SCALES

Site Size	Map Scale
3–5 acres	not less than 1 inch = 50 feet
5–10 acres	not less than 1 inch = 100 feet
10 or more acres	not less than 1 inch = 200 feet

OTHER MAP REQUIREMENTS

Each map must include a:

- Scale Bar scale North arrow
- Legend with all symbols defined or explained
- Title block with the following information:
 - Application/permit number Title of map
 - Name and address of applicant/permit holder(s)
 - Space for signature Map/exhibit number
 - Date map was drawn or revised

SITE ACCESS MAP

On an 8½ x 11 or 11 x 17 inch copy of the pertinent section of a U.S. Geological Survey 7.5-minute quadrangle, clearly show how to get to the site from the nearest town.

The boundary of the permit area should be shown on this map.

PRE-MINING TOPOGRAPHIC MAP

This map is necessary to establish the location and setting of the mine site. It must show:

- Permit area plus an appropriate border on all sides
- Elevations and contours, natural ground slopes, drainage patterns, and other topographic features (Contour intervals are deemed adequate if they accurately reflect the conditions of the site. Generally, contour intervals should be between 5 and 20 feet.)
- Boundaries and names of counties and municipalities
- Boundaries of property ownership, including adjacent properties
- Names and addresses of adjacent property owners
- Locations and names of other mines
- Locations and names of all roads, railroads, utility lines, or any other rights of way
- Locations and names of all streams and natural and manmade drainways
- Locations and names of all significant buildings, parks, and other manmade features
- Locations and names of all wells, lakes, springs, and existing wetlands (Existing wetland must be clearly shown on the plans. If wetland questions arise, contact the Department of Ecology [DOE].)
- Boundaries of the areas that will be disturbed by mining.

RECLAMATION SEQUENCE MAP

This map shows the details of the plan for mining and segmental reclamation. It should cover the same area as the pre-mining topographic map and display the following information:

- Permit area plus an appropriate border on all sides
- Boundaries of all areas that will be disturbed by mining
- Locations of all permanent boundary markers
- Locations of proposed access roads to be built in conjunction with the surface mining operation and whether they will be reclaimed or left as roads
- Locations and types of setbacks and berms

- Numbered segments and the direction and sequence of mining; avoid mining from the center outward
- Topsoil storage areas and sequence of stripping, storing, and replacement on mined segments
- Overburden storage areas and sequence of stripping, storing, and replacement of soil on mined segments
- Waste rock piles and how they will be reclaimed and stabilized
- Operation plant and processing areas
- Measures taken to protect adjacent surface resources, including prevention of slumping or landslides on adjacent lands
- Location and description of the erosion control systems, including drainage facilities and settling ponds
- Other pertinent features.

FINAL RECLAMATION MAP

This is a topographic map of the site as it will look after final reclamation. It must show all applicable data required in the narrative portion of the reclamation plan and details of the mine reclamation. The map should cover the same area as the pre-mining topographic map and should display the following information:

- Permit area plus an appropriate border on all sides
- Final elevations and contours, adjacent natural ground slopes, reclaimed drainage patterns, and other topographic features
- Locations and names of all roads, railroads, utility lines, or any other rights of way
- Locations and names of all streams and drainages
- Locations and names of significant buildings, parks, and other structures, facilities, or features
- Locations and names of all lakes, springs, and wetlands
- Location and depth of replaced topsoil
- Permanent drainage and water-control systems (with expanded view, if needed)
- Areas to be revegetated and proposed species
- Other information pertaining to the permit and required by statute.

CROSS SECTIONS

At least two cross sections (generally at right angles) that extend completely across the permit area and show original topography and final topography and water table. Often more than two cross sections will be needed to adequately show conditions at the site.

GEOLOGIC MAP

A description of the geologic setting and the type of deposit to be mined may occasionally be required by DNR.

Do-it-yourself geologic maps can be created through the [Washington State Geologic Information Portal](#).

Geologic maps of many [Washington quadrangles](#) are online. Published geologic maps not online may be consulted at the [Washington Geology Library](#) and many university libraries.

In complex situations, a [consulting geologist](#) may be needed to make a map for you.

PHOTOS AND OTHER SUPPORTING DATA

Aerial and (or) other photographs should be submitted in support of the application. Additional maps, photos, and detailed reports may be required by DNR.

Orthophotography is available from the:

[Washington State Department of Natural Resources](#)
[Washington State Department of Transportation](#)
[University of Washington](#)

Additional Requirements for Mines in Flood Plains

Additional information may be required for mines in flood plains if the site is:

1. In a river stream channel,
2. In a 100-year flood plain, or
3. Deeper than the deepest part of the active channel.

The scope of the required information will be based on site characteristics and project scale. If the project has the potential to impact water quality or quantity of a legal user an additional written plan may be needed. This written plan should provide evidence through data collection and analysis, mine plan restrictions, and/or mitigation that the planned activity will not adversely affect other groundwater users. (You may need the help of a qualified [professional](#).)

Information required may include:

- A topographic map of the existing conditions and surrounding lands at a 2-foot contour interval and appropriate scale. (This may require surveying the property.)
 - Maps and cross sections that show depths and locations of all bodies of water, the stream profile, and the measured elevation from a permanent station such as a nearby bridge. (Elevation should be referenced to mean sea level [msl].)
 - A geomorphic analysis that identifies historic channels and channel migration trends on the basis of examinations of all available data, such as historic air photos and maps, and that considers geological and artificial controls on the channel, such as armored banks, dikes, bridges, dams, and other mine sites. (The Washington Geology Library maintains a collection of historic 7.5-minute quadrangle topographic maps.)
 - A detailed chronology and description of historical precipitation (see Precipitation Guides on [Forms webpage](#)), flooding, discharge, sediment transport, including description of sediment sizes in and adjacent to the proposed mine site. Include any prior known ice damming events.
 - Maps of vegetation, and analysis of its role in flood and erosion control, as well as a description of the relation between the sediment distribution and the biota, especially as it applies to bank erosion and avulsion.
 - An analysis of avulsion or stream capture potential, including the consequences of stream capture, channel incision, and scouring of a stream channel that is overly wide and deep. Analysis should consider potential damage to neighboring properties, fish and wildlife habitat, bridges, and rights-of-way and evaluate the effects of existing or proposed dikes and levees and their long-term maintenance. Include data on length of time to refill ponds
- Evaluation of the hyporheic zone for potential effects on ground water and benthic macroinvertebrates;
 - Evaluation of effects on fish and wildlife.
 - Temperature monitoring—groundwater, surface water and air.
 - A geohydrologic analysis that addresses channel stability, magnitude, and frequency of the 5-, 10-, 25-, and 100-year floods, channel and flood-plain hydraulics near the proposed mine site, and any previous stream capture events.
 - Because flood-plain gravel pits are in the dynamic riverine environment, the reclamation plan should take into account the long-term stability of the site and include proposals for enhancing or restoring the site's fish and wildlife habitat.
 - A complete description, with appropriate maps and engineering drawings, of all proposed mitigation measures to address impacts to fish, fish habitat, wildlife, wildlife habitat, avulsion and stream capture, river morphology, and structures.
 - Identification and evaluation of downwelling.;
 - Evaluation of spring and brook dewatering impacts.
 - Information regarding your monitoring program before, during, and after mining.
 - Other information as specified by the Department of Natural Resources.

Some of the main goals of planning, siting, and reclamation of these types of mines are:

- Flood-plain mining **should not** increase the potential for river avulsion.
- Fish and wildlife habitat should be protected.
- Riparian areas should be protected, both to provide habitat and to provide flood-plain stability.
- If flood-plain mining is approved, reclamation should ultimately enhance salmonid habitat.

Additional Requirements for Mines in Hydrologically Sensitive Areas

Additional information may be required for mines in hydrologically sensitive areas if:

1. The proposed site is in or within one mile of a critical groundwater area, sole-source aquifer, areas with vulnerable groundwater quantity resources, well-head protection area, critical-aquifer recharge area, public water supply watersheds, aquifer protection areas, or an area of groundwater restricted classification.
2. De-watering or mining operations may impact adjacent users (wells or springs) or rivers and streams.
3. The site is underlain by multiple aquifers or complex hydrogeology.
4. The proposed depth of mining may impact or breach a confining layer.
5. The proposed site will be backfilled with imported material.

The scope of the required information will be based on site characteristics and project scale. If the project has the potential to impact water quality or quantity of a legal user, an additional written plan may be needed. This written plan should provide evidence through data collection and analysis, mine plan restrictions, and/or mitigation that the planned activity will not adversely affect other groundwater users. Information required may range from or include:

- Identification, review, and submittal of adjacent well logs. Their location must be shown on a suitable map.
- Inventory of adjacent water rights and water use.
- Measurement of static water levels in adjacent wells and a survey in well-head locations.
- Determination of the current potentiometric surface.
- Drilling data and completion from one to numerous observation wells. Definition and/or delineation of presence/absence of confining bed(s).
- A groundwater monitoring program during mining.
- Development of an area groundwater budget and projection of mining impacts thereon.

Additional Requirements for Mines with Steep or Potentially Unstable Slopes

Additional information may be required for sites with high probability of failure if:

1. There will be loading or unloading on slopes >60% where (a) fills are greater than 2 vertical feet and/or (b) cuts are in excess of 20 vertical feet.
2. There will be loading or unloading on steep slopes (30–60%) where (a) fills of waste rock, overburden, or soil are deeper than 25 vertical feet and/or (b) cuts are in excess of 100 feet in rock or 20 vertical feet in soils steeper than 11/2:1 (h:v).
3. There will be overburden or waste- or reject-rock storage or dump construction on moderate slopes (15–30%) where (a) fills of waste rock, overburden, or soil are deeper than 25 feet or (b) any storage within 300 feet of a stream or body of water under Shoreline Management Act jurisdiction is proposed.
4. There will be overburden, waste- or reject-rock storage, or dump construction where proposed subsequent use suggests backfill meet standards of compaction or other attribute that will support the proposed subsequent use.
5. There is evidence of geomorphic/geological instability, in that (a) the site possesses ancient landslide features, such as scarps, old landslide scars, hummocky terrain, seeps, tension cracks, slumps, and sag ponds or a predisposed weakness, and/or (b) the area or an adjacent area has been mapped as a landslide, unstable, or potentially unstable.
6. There are unconsolidated or poorly consolidated deposits that will be mined and left as deep water-filled pits within 500 feet of an external property line.

The scope of the required information will be based on site characteristics and project scale. If either down-slope risk or the probability of failure is high, a written plan may be required to explain how the resource will be protected.

Information required may include:

- A report describing pre-existing conditions, identifying slumps, mid-slope benches, hummocky terrain, springs, and ancient landslide features.
- A written plan that demonstrates protection of the resource and includes geotechnical mitigation and method of stabilizing slopes.
- A geotechnical investigation and design by a geotechnical engineer or engineering geologist, which may include collecting on-site data to determine stability.
- A slope-stability analysis from a Licensed Engineering Geologist (LEG) or Professional Engineer (PE) that demonstrates an adequate Factor of Safety (FS). The slope stability analysis should discuss the methods, assumptions, and data used for modeling. For example, saturation, angle of friction, cohesion, slip surfaces, and geology. The analysis should also consider how the slope will perform under seismic conditions appropriate for the subsequent use, considering standards provided in the International Building Code and predicted ground motion from the USGS.
- A monitoring plan.
- For water-filled pits, a written monitoring and reporting program that includes regular depth soundings on an appropriately sized grid to ensure that water-filled pits have reclaimed slopes as designed and approved.
- Other information as specified by the DNR.