



AGENCY OF AGRICULTURE, FOOD & MARKETS
116 State Street
Montpelier, VT 05620-2901

Act 250 Procedure:

Reclamation of Vermont Agricultural Soils

Revised 10/30/2014 by the Vermont Agency of Agriculture, Food and Markets,
with assistance from USDA Natural Resources Conservation Service (NRCS) and
Ben Waterman, soils consultant

The reclamation of Agricultural Soils is technically feasible from the Agency of Agriculture's perspective. However, to ensure that the soil is returned to a physical and biological state that is comparable to the soil quality prior to activities of potential adverse impact, the following parameters should be addressed in the site reclamation plan.

Part 1. Pre-disturbance phase:

1) Prepare a pre-disturbance General Site Characteristics report, including:

- a) Maps: 1) a map showing the existing site topography, 2) an NRCS soil map showing the distribution of all NRCS soil survey map units and their acreage, 3) an NRCS soil map showing areas with a farmland classification rating of prime, statewide importance or local importance on the site and their acreage, 4) a map showing the extent of the proposed disturbance. For purposes of this document a "disturbance" is any activity that involves excavation, modification of soils or potential compaction of soils with heavy equipment. The NRCS soil maps can be either GIS-generated or from Web Soil Survey. Scale should be a minimum 1:12,000 or as large as necessary to delineate all soil map units.
- b) An additional map (labeled "Agricultural Soil Reclamation Map") that identifies the proposed location of the soil stockpiles, the area to be reclaimed, and the final topography if it will be different than existing. A narrative that outlines the proposed reclamation map should be provided. Scale should be large enough to delineate all relevant areas.
- c) Information on the existing on-site soil conditions:
 - i) For areas to be excavated: One on-site soil profile description representing the area to be disturbed. If the area to be disturbed spans more than one NRCS soil survey map unit, at least one profile description should be completed for every map unit to represent all impacted areas. The description(s) should include depths to and thickness of A, E, B and/or C horizons, USDA texture class, soil structure and moist consistency ratings for samples within each horizon. Soil profiles should be at least 48" deep. For profile description protocols, refer to: *The Field Book for Describing and Sampling Soils, version 3.0 (Schoeneberger, Wysocki, Benham, and Soil Survey Staff, 2012)*, available online and in print at USDA-NRCS service centers.
Note: soil profile descriptions are not necessary for areas whose only potential disturbance is soil compaction.
 - ii) For areas to be excavated and/or compacted, one representative soil sample from each map unit impacted and subject to reclamation shall be submitted to measure

pre-disturbance soil productivity using the Cornell Soil Health Assessment Package testing service (<http://soilhealth.cals.cornell.edu/extension/test.htm>)

- iii) For areas to be excavated and/or potentially compacted with heavy equipment: Soil compaction status should be measured for impacted areas, with at least one measurement for each NRCS soil map unit. Compaction can be measured by performing a soil bulk density test for the topsoil (A horizon). Alternatively, to measure surface and subsurface hardness, penetrometer readings can be taken using a field penetrometer with field penetration resistance measured in psi.
- iii) For areas to be excavated, soil pH should be measured before disturbance with at least one test for each NRCS soil map unit using University of Vermont or other Cooperative Extension or professional soil testing kits and protocols.

Part 2. Soil removal and stockpiling phase:

- a) Soil material and woody material, if present, should be stockpiled into several distinct piles:
 - i) Surface organic soil material (if present) and the dark topsoil material (A horizon) in one pile.
 - ii) Loamy brownish subsoil material (B horizon) in a separate pile.
 - iii) Unconsolidated bedrock, such as bank-run gravel or un-weathered soil parent material (BC or C horizon) in a separate pile. *(Note: In Vermont aside from recently-formed floodplain soils, it is uncommon in shallow disturbances to reach the C horizon; however, in the event this layer is disturbed, it should not be mixed with other subsoil. This will enable subsoil layers to be restored to their original order in the soil profile to the extent possible.)*
 - iv) Woody stumps (where present) should be removed and stockpiled in a separate pile. If woody stumps have not been chipped, soil that is attached to the roots will eventually dry out and fall off the roots. To speed up this process, use an excavator to shake the roots clean. This is some of the best topsoil and should be added to the stockpiled topsoil. The stumps can then be chipped or ground and added to the woody stockpile, or used in the re-sloping process.
- b) Stockpiling of the soil and woody material is to be in predetermined locations that can be monitored over the life of the excavation and reclamation.
- c) To minimize potential for erosion, soil stockpiles should be seeded or temporarily stabilized with application of straw mulch or other erosion control matting to maintain a uniform cover until soil is backfilled and restored. If stockpiles are to be kept in place throughout the winter and soil disturbance is completed by October 15, they should be stabilized with seeding of winter rye. Additional cover such as hay/straw mulch or erosion control matting should be installed if seeding of rye can't be accomplished before September 15. For sites with earth disturbance occurring after October 15th, Vermont Agency of Natural Resources guidelines for winter erosion control on construction sites should be followed. (see http://www.anr.state.vt.us/dec/waterq/stormwater/docs/construction/sw_low_risk_site_handbook.pdf)

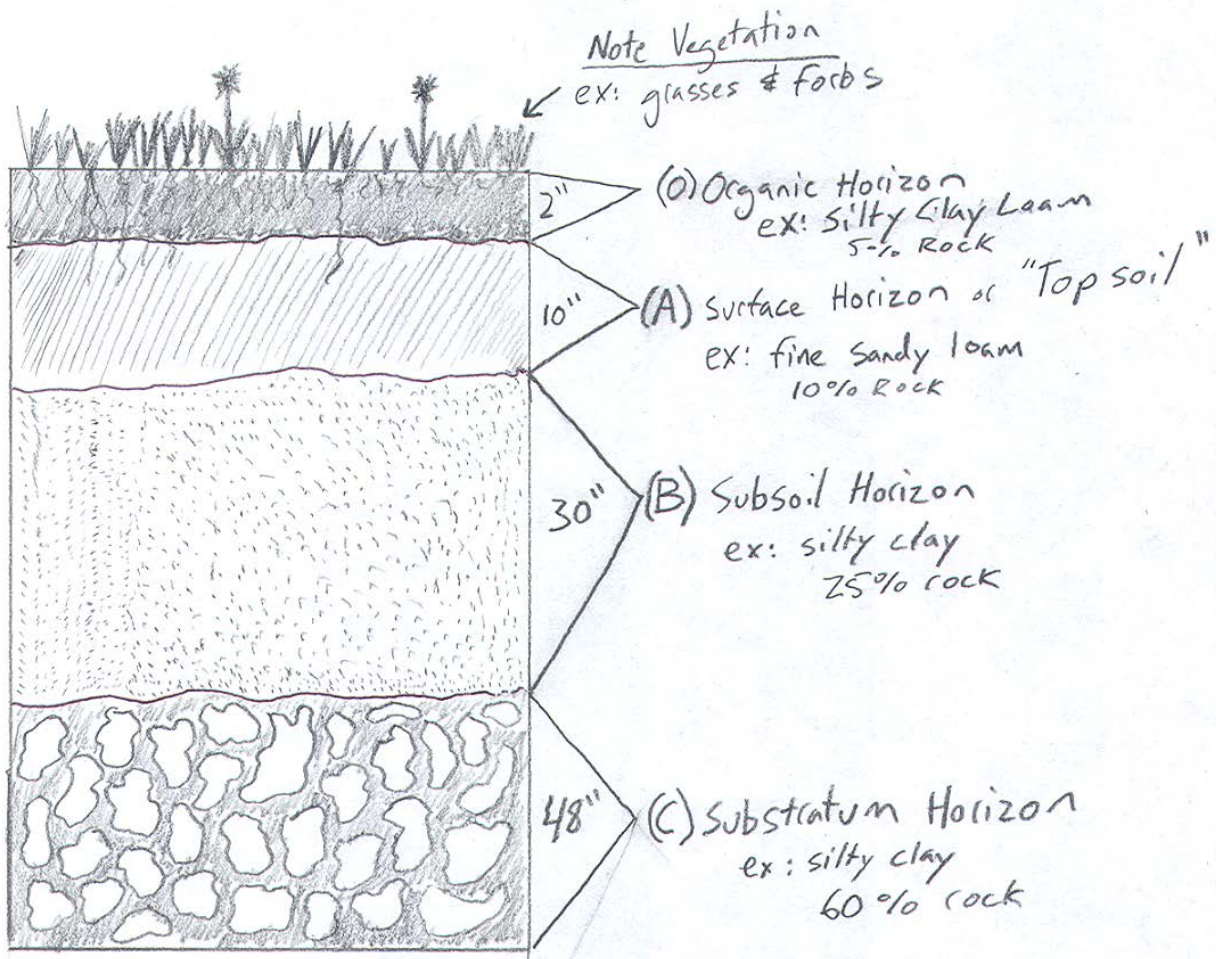
Part 3. Reclamation phase:

- 1) In areas where soils with a NRCS farmland classification of prime, statewide or local importance are to be reclaimed, the final site topography should have slopes less than 15 percent. It is preferred that level to slightly convex areas, with slopes between 0% and 8% slopes, are created, with no concave areas where water may pool.

- 2) Soil stockpiles should be layered in the following sequence:
 - a) Soil that was originally deepest in the soil profile should be placed first, directly above the re-graded base material and graded to the final slope contours
 - b) Soil that was originally shallow layers of subsoil replaced before topsoil and re-graded
 - c) The topsoil material is then placed on top of the re-graded subsoil material
 - d) The thickness of topsoil material overlying subsoil layer(s) should approximate the pre-disturbance thickness.
 - e) One representative soil sample from each map unit subject to reclamation shall be submitted to measure post-reclamation soil productivity using the Cornell Soil Health Assessment Package testing service to verify that soils have been effectively reclaimed in all impacted areas (<http://soilhealth.cals.cornell.edu/extension/test.htm>).
 - f) Exposed soil should be seeded and mulched as soon as possible after final grading to prevent erosion and allow for the establishment of vegetation. In cases where a farmer or landowner intends to cultivate or plow the area within two weeks of completion of the soil reclamation and final grading, the area does not need to be seeded. The selection of the seed cover can include input of the landowner based on pre-construction land use and land cover to ensure that introduced grass or vegetative species do not adversely impact future soils productivity for hay, pasture or crops. Seed can be selected for soil stabilization qualities, its likelihood for successful establishment given soils and time of year, and its compatibility with adjacent land uses. For guidelines and information on erosion control and seed stabilization practices see <http://efotg.nrcs.usda.gov/references/public/VT/WSGguide.pdf> or http://www.anr.state.vt.us/dec/waterq/stormwater/docs/construction/sw_low_risk_site_handbook.pdf or [ftp://ftp-fc.sc.egov.usda.gov/VT/E-FOTG/Technical References/ConsPlanning/Veg Grav Pits.pdf](ftp://ftp-fc.sc.egov.usda.gov/VT/E-FOTG/Technical%20References/ConsPlanning/Veg_Grav_Pits.pdf).
- 3) Final soil productivity testing should be performed on the same areas tested prior to soil disturbance. Results should be similar to the original, pre-disturbance measured readings. If bulk density is higher than tested originally, subsoiling, plowing or other methods of decompaction should be employed to alleviate soil compaction. Soil material should not be spread or driven on by heavy machinery when it is very wet, otherwise, soil compaction could be severe. Reclaimed topsoil layers should have a pH within 0.5 points of the pre-disturbance reading(s). Lime can be applied at rates recommended by soil test labs to raise soil pH if necessary. If soil tests indicate the pH is lower than 6.0, in most cases unless specifically requested by a farmer, lime can be applied at the recommended rate to bring the pH up to within the range of 6.0-7.0.

ATTACHMENT A

Examples of a Soil Profiles:





For this profile: surface organic material and loamy dark brown topsoil (A horizon) go to about 8 inches, brownish loamy subsoil (B horizon) goes to about 30 inches or so, then lighter colored gravelly substratum (C horizon) starting at 30 inches...