

FOREST MANAGEMENT ON SOILS IN BASALT TALUS

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The volcanic basalt flows of Tasmania were erupted about 20 million years ago, and have since been deeply weathered. Because basalt contains a low percentage of sand-sized minerals resistant to weathering, it has weathered to clays. The clay minerals formed by basalt weathering have a platy structure and easily slide over each other. They can also take up large amounts of moisture, enhancing their slipping qualities. At the same time as the basalt flows have been weathering, rivers like the Forth and Wilmot, and many other smaller streams, have been downcutting through the basalt, producing steep-sided valleys. As a result slopes in the basalt terrain have been steepened to the extent that the weathered basalt has become unstable and has periodically slipped in small and large slumps, over many thousands if not millions of years, producing the characteristic and widespread slumped topography identified on geological maps as “Basalt talus”. A key feature in the slumping process has been drainage: slumps generally occur where the potential slip plane has been lubricated by trapped water and subsurface seepage. The slumping process itself disrupts drainage, so that the drainage pattern in basalt talus is complex and unpredictable.

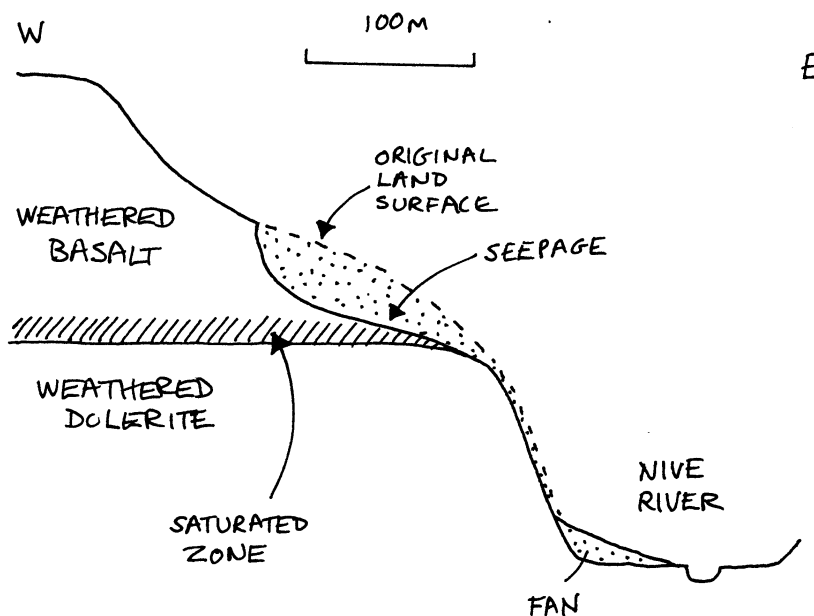
The guidelines below were written with the help of Mike Laffan of Forestry Tasmania, Nathan Duhig of the Forest Practices Board, and foresters. They are based on two assumptions: (1) that it is best to leave the slumped basalt talus topography largely in its natural state, rather than try to “fix” drainage problems or stabilise slumped areas; and (2) landslides are likely to occur after extreme events (e.g. infrequent heavy rainfall) and where possible these events should be allowed for in forest management.



Where possible sidecutting into basalt talus should be minimised and cuts into the toes of old landslides should be avoided, as further slumping is likely to occur on the oversteepened slopes.



A landslide in basalt talus that occurred in the Nive River catchment as a result of very heavy rain in October 2001. Many ancient landslides were visible in the same area. In this case the primary cause of the landslide appeared to be enhanced lubrication of the weathered basalt-weathered dolerite contact, by entirely natural causes, as shown in the explanatory sketch below. In similar situations forestry operations should be designed to minimise disruption and redirection of drainage.



A common cause of landslides in basalt talus is lubrication of an existing or potential slip plane. In the Nive catchment landslide of October 2001 impermeable weathered dolerite below the basalt trapped water at the basalt-dolerite contact. As a result the basalt material represented by the stippling moved down the steep slope adjacent to the river. Similar saturated zones can occur within the basalt talus deposits themselves, or at contacts with other rock types such as sandstones and siltstones.



Near-vertical crescent-shaped exposures of bare soil indicate active or recent earth movement. In this young grassy plantation the exposures are obvious but under native forest they can be more difficult to detect. Bare soil, cracks in the ground, even-aged young stands and distorted trees can be an indication of recent movement. Where there is a suspicion of active land movement in basalt talus terrain on which forestry operations are planned the FPB should be informed.

GUIDELINES FOR FORESTRY OPERATIONS ON BASALT TALUS

Landform slope class	Majority slope angle	Timber harvesting	Plantation establishment
Rolling	0-11° (0-20%)	<p>Clearfelling OK if no signs of active landslides or seepage; keep road cut batters low; avoid:</p> <ol style="list-style-type: none"> 1. cutting into toes or headwalls of old landslides when roading 2. disturbing wet areas 	<p>No cultivation within 5 m of Class 4 stream, or 10 m of Class 3 stream, or 20 m of a Class 1 or 2 stream, on farmland (but spot spraying OK); for previously forested land, the no-machinery limits of Code 2000, table 8 apply; keep road cut batters low; during ground preparation avoid:</p> <ol style="list-style-type: none"> 1. deep ripping 2. cutting into toes or headwalls of old landslides when roading 3. disturbing wet areas 4. concentrating (ponding) water behind mounds 5. creating “new” streams
Hilly	12-19° (21-35%)	<p>Clearfelling OK if no signs of active landslides or seepage; consult with FPB soil specialist if slopes >15° (see Code 2000, table 7); keep road cut batters low; avoid:</p> <ol style="list-style-type: none"> 1. cutting into toes or headwalls of old landslides when roading 2. disturbing wet areas 	<p>No cultivation within 10 m of a Class 4 stream or 20 m of Class 1, 2 or 3 stream on farmland (but spot-spraying OK); for previously forested land, the no-machinery limits of Code 2000, table 8 apply; contour-mounding (topsoil only) recommended; angle contour-mounds to existing drainage lines; keep road cut batters low; during ground preparation avoid:</p> <ol style="list-style-type: none"> 1. deep ripping 2. cutting into toes or headwalls of old landslides when roading 3. disturbing wet areas 4. concentrating (ponding) water behind mounds 5. creating “new” streams
Steep	20-26° (36-49%)	<p>Consult with FPB soil specialist (see Code 2000, table 7); clearfelling not generally recommended but may be OK if there are no signs of active landslides or seepages, or on short slopes <20 m; limit disturbance - no roads</p>	<p>No mounding; spot disturbance only (see Code 2000, table 10) (rotary spot cultivation not recommended) but not within 20 m of any stream; spot-spraying OK; avoid disturbing wet areas; limit disturbance - no roads</p>
Very steep	27° + (50%+)	<p>Consult with FPB soil specialist (see Code 2000, table 7); protection forest advisable; no ground-based logging; no roads; under certain circumstances, e.g. slopes just exceeding 26°, cable logging may be permitted but consult with FPB</p>	<p>Plantations not advisable – allow land to revert to native forest or plant for soil conservation; no ground-based machinery or cultivation (see Code 2000, table 10); no roads.</p>