

Mass Wasting

What is mass wasting

Mass wasting is the movement of soil and weathered rock down a slope. Weathering and erosion will break down the rocks, and mass wasting is the movement of it down a slope.



Types of Mass Wasting

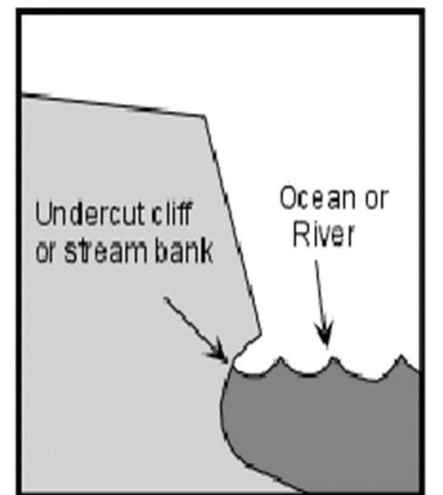
Mass Wasting Type	Type of Material	Rate of Movement	Level of Destruction
Creep	Loose weathered material (especially soil)	Really slow	low
Flow	Rocks and soil (commonly mud)	Medium to fast	High
Avalanche	Snow and ice, or rock and soil	Fast	Medium to high
Slump	Rocks and soil moving as one mass	Relatively slowly	Medium
Landslide	Rocks and soil and it will pick up biological material	Fast	High
Rock fall	Rocks	Really fast	High

Choose two types of mass wasting, and describe how it would change the landscape. For example, what is moved/ deposited, and what is weathered/ broken down.

Factors influencing mass wasting

There are several factors that determine if a mass movement will happen.

- The nature of the soil or material in question
 - For example, if the material will easily flow (this is called shear strength)
- The shape and angle of the slope
 - A higher angle= a more likely mass movement
- Undercutting of a slope by stream erosion, wave action, glaciers, or human activity such as road building,
- Intense or prolonged increase in water (lots of rain or snow)
 - This makes soil and rock more likely to flow or move
- Shocks or vibrations caused by earthquakes or construction activity,
- Loading on upper slopes



Any combination of these factors can cause a mass wasting event

All these factors are influencing mass wasting. How might climate change, change some of these factors? How would that change affect mass wasting?

B.C. Example

Logger's Creek in 1991

Along the Squamish Highway there was a rockslide that cost \$7 million in repairs and later preventive structures. This slide caused the highway and B.C. Rail track to be closed for two weeks.

The rockslide also removed trees along its path of destruction. This change in the landscape makes another rockslide more likely because trees make soil and rocks more stable.

The rocks slide also carved a path for future rockslides to move down.



Brittania Beach

Before the 1921 flow



After the flow

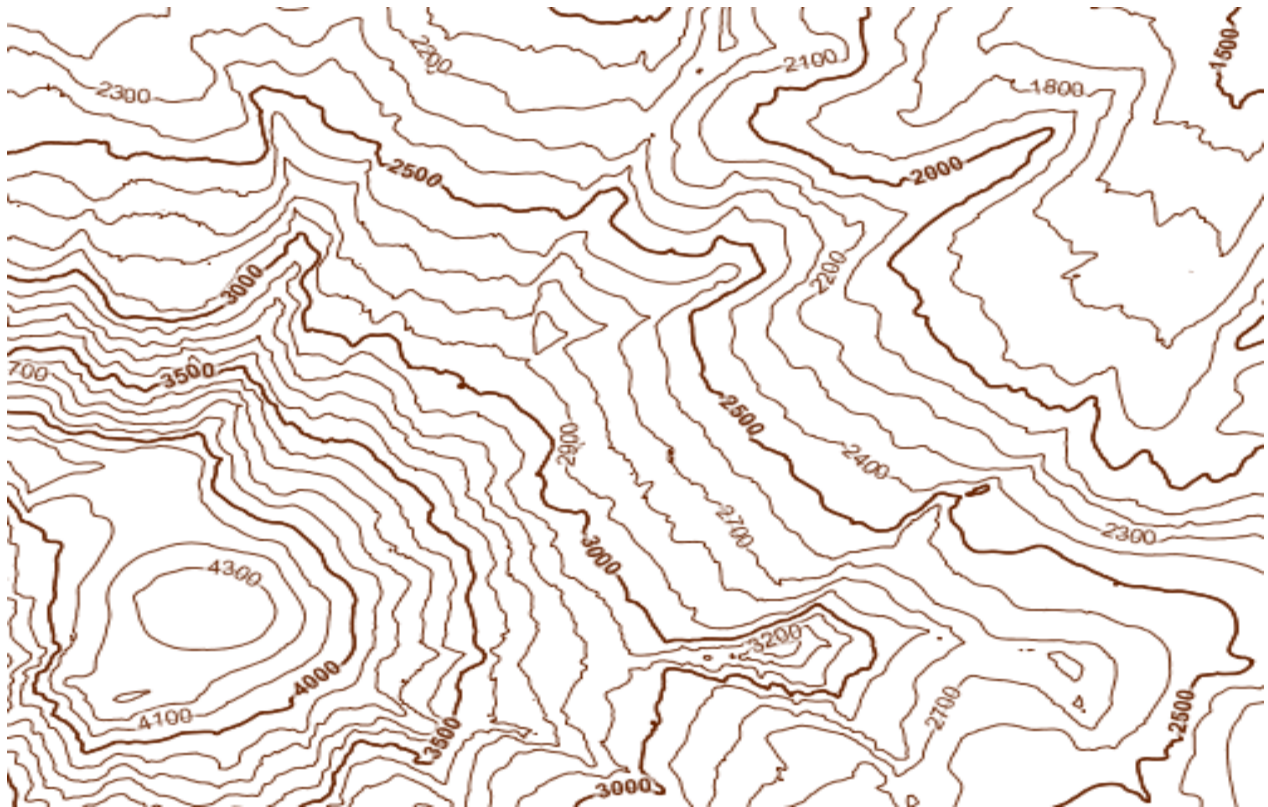


Describe how the landscape has changed after the flow

Topography Map

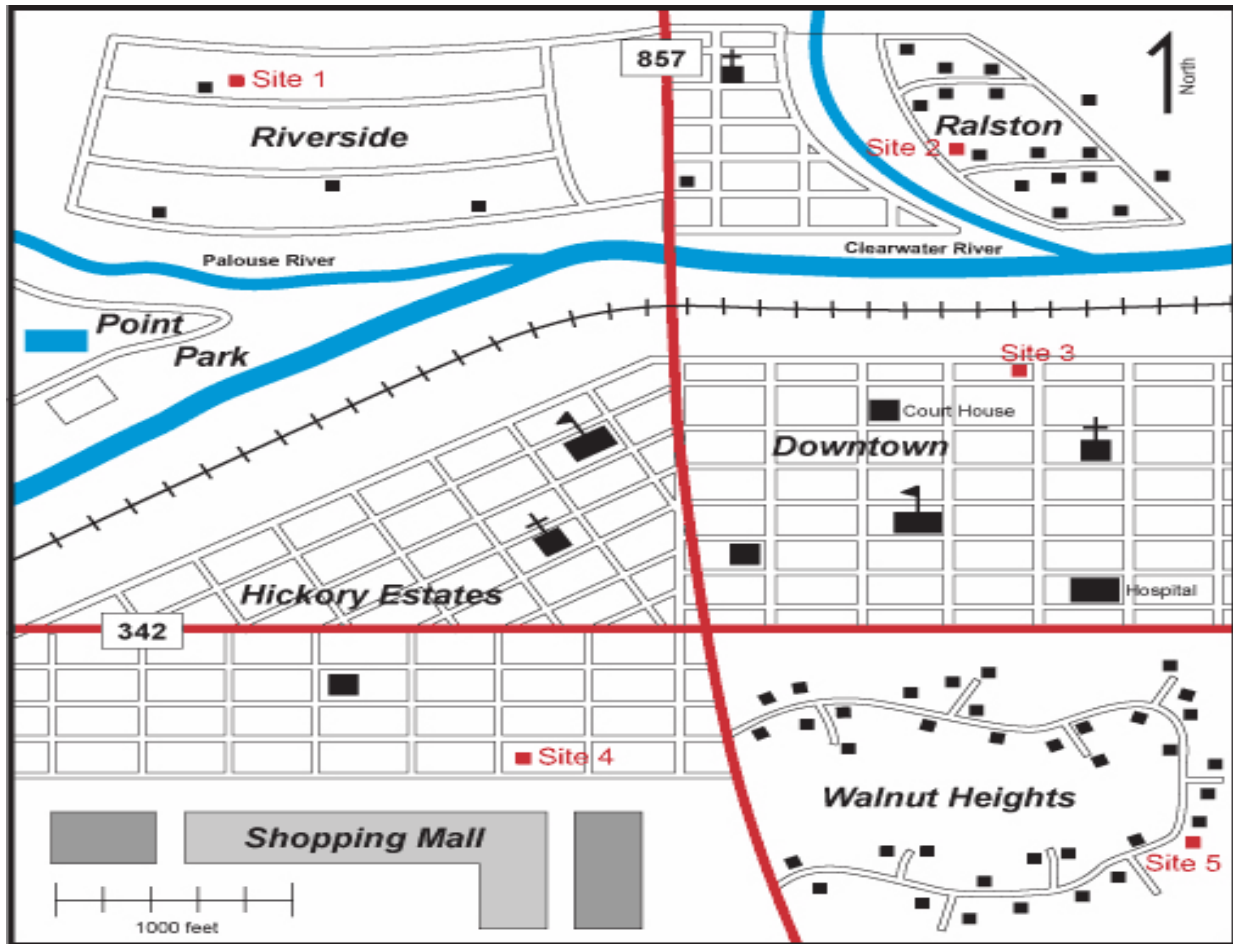
Topographic maps are maps that show the earth's elevation or height. They use contour lines that join all points that are the same height. Similar to the isobars we learned about when we studied high and low pressure systems. The map below is an example of a topographic map.

Label the highest point (H) and lowest point (L) on the map.



Case Study

You have been hired to complete a landslide hazard assessment for five potential development sites. The locations of these sites are shown on the map below. Your client, a housing contractor, is considering these for purchase and development. Your job is to determine the potential for landslides at each of these sites and recommend any that are suitable for construction of single-family homes.



Landslide Hazard Assessment

Landslides do not occur at random locations. They occur in specific places for specific reasons. First landslides need a steep slope. The steeper the slope is the more likely the landslide will be. Second, soils with a low shear strength (this means that the soil will flow very easily) make landslides more likely. Therefore, for a landslide to occur there needs to be a steep slope and low shear strength soils.

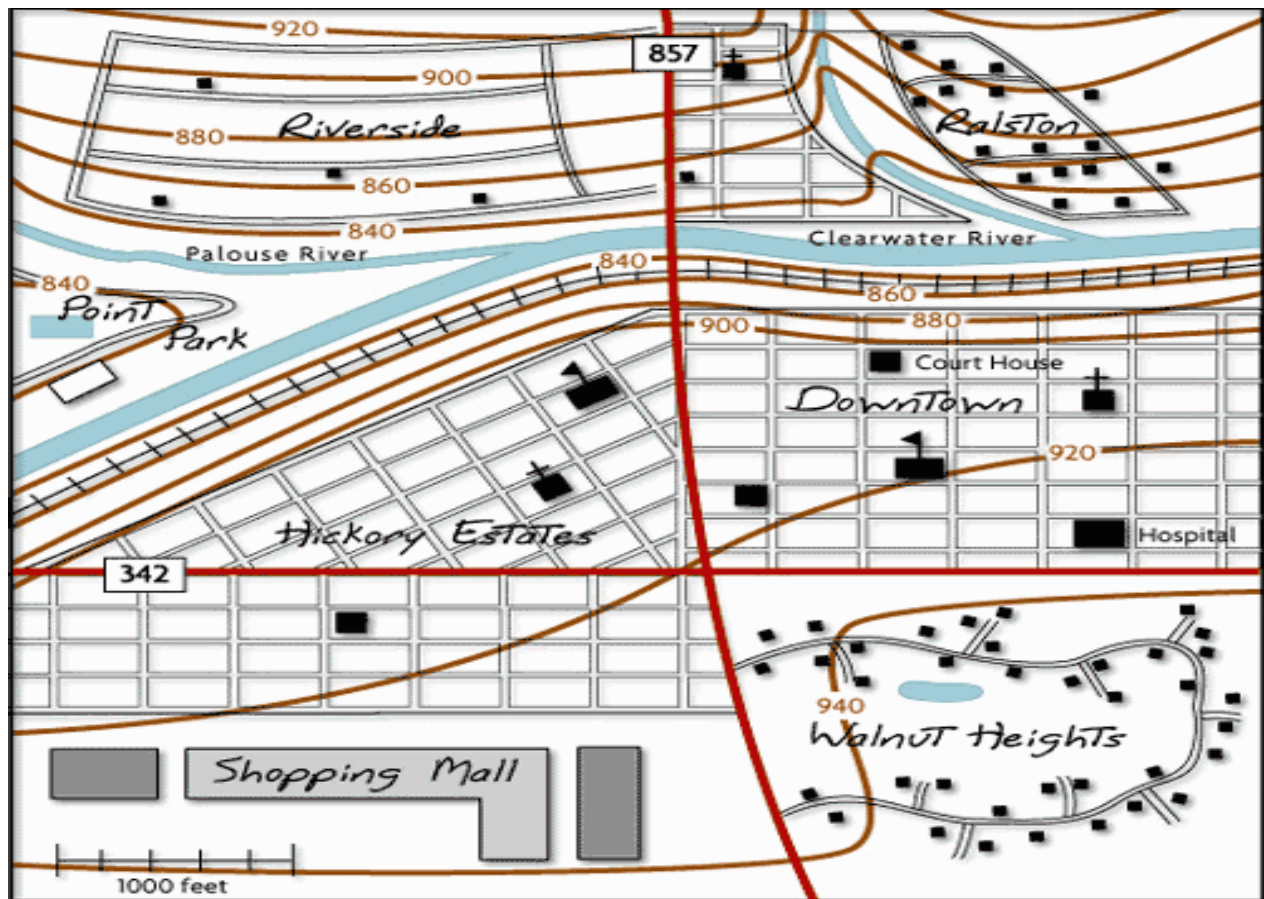
The landslide assessment chart below shows the relationship between slope steepness, shear strength, and landslide hazard.

	High Shear Strength	Low Shear Strength
Gentle Slopes	most stable	Develop with a lot of caution
Steep Slopes	develop with caution	very dangerous

Topography Map

Topographic maps are maps that show elevation. This is usually done using color patterns or contour lines (lines that connect points of equal elevation). The topographic map below is of the area where your client's properties are located. Notice the brown contour lines that are used to show elevation.

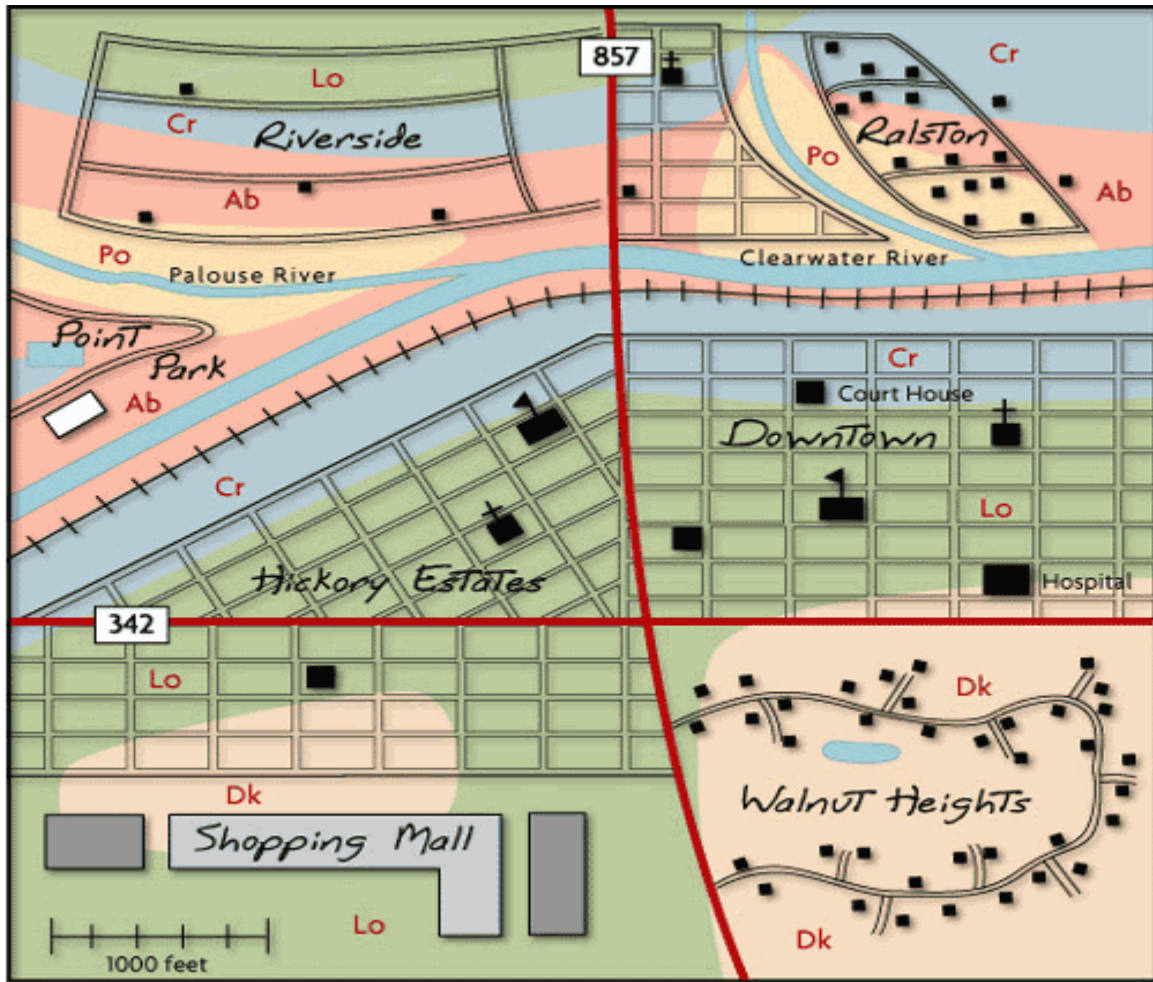
Now, the key point for landslides: if the contour lines are close together (like on Route 857 in Riverside), the landscape is steep and the potential for landslides is high (ignoring other factors). However, if the contour lines are few and far-between (like on Route 857 between Downtown and Walnut Heights), then the landscape is flat and the potential for landslides is lower.



Soil Map

In a large city, such as Hazard City, there are many different types of soil. Your job is to analyse the soil types for their shear strength to determine whether it is a hazard for landslides. Use the chart below to determine which area has low, medium, or high shear strength.

Reminder: low shear strength makes landslides more likely!



Soil Series	Map Symbol	Shear Strength
Alluvial Land	Ab	variable
Craster	Cr	low to moderate
Dekalb	Dk	Moderate to high
Findlay	Fn	low to moderate
Lomax	Lo	Moderate to high
Pope	Po	low to moderate
Wilsondale	Wi	moderate

Questions:

Describe why you would or would not recommend building houses at each site.

Site 1: _____

Site 2: _____

Site 3: _____

Site 4: _____

Site 5: _____

Rank the five different sites in order of most to least safe. Explain why you put them in this order.

