

**GEOM 3002: Lab 2**  
**ELEMENTS OF VISUAL IMAGE INTERPRETATION**

NAME: \_\_\_\_\_ STUDENT #: \_\_\_\_\_

**Due September 26, 27 at the beginning of your lab period.**

**Total marks:  $56 \div 11.2 = 5\%$  of final course grade**

In each of the following, circle the correct answer for each underlined set of choices or complete the answer (using only a few words). One mark for each answer. Each question number corresponds to the Q# in the upper left of the photos.

**FOLDER 1 TONE:**

1. The sun was shining from the north / east / south / west.

How did you deduce this? Shadows on right side of hills. 0.5 for topo or other decent answer.

Of the two dominant land cover types in these photos, rock and water, which reflects more of the sun's energy?

Rock

The water body to the left of A is bright in the right photo and dark in the left photo. Why?

Reflection of sun rays directly into the camera (specular reflection; sun glint, etc.).

2. At A, B and C, there are u-shaped landforms called oxbows (see next lab) that are formed when a river meander gets cut-off. However, these three oxbows have different tones.

Which has the darkest tone? A

This dark tone (low reflectance) is typical of what cover type? clear water / grasses / shadow.

At B the medium reflectance is caused by: sand and gravel / short vegetation / trees

At C, the bright reflectance is high / low and is caused by sand deposits / rock / sediment in water / vegetation.

3. The field at A is vegetated / bare and has lower / higher reflectance than the field at B, which is vegetated / bare.

The deciduous (broad-leaved; e.g., maple, poplar, birch, oak) trees at C are generally brighter / darker than the coniferous (needle-bearing e.g., spruces, pines) trees at D (here in a plantation).

The trees at C are also generally taller / shorter than the trees at D.

**FOLDER 2 TEXTURE:**

1. In the fields at A and B, two image textures are evident (circle two):

botryoidal / mottled / smooth / flecked / linear

Which texture is an indicator of glacial till? mottled

In the field at C, this texture is also evident. The dark areas represent (circle 3 possibilities): water body / dry soil / wet soil / rock / vegetation / depressions / higher elevations.

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2. Water is at A, a commercial/light industry area is shown at B, and a residential area is shown at C. Briefly state what differences in texture or pattern help distinguish these three land cover types (3 marks).

**Water has smooth texture: Texture/pattern is coarser and blocky in commercial; finer in residential due to small streets, buildings and trees**

3. Texture at A and in many places throughout these photos: **mottled**.

What is the photo scale (see back of left photo)? **1:36,200** Visually comparing these photos with the photos of Q1, the scale of these photos is **larger / smaller** than that for the Q1 photos.

**FOLDER 3 DRAINAGE:**

1. The drainage pattern around A that is evident through the multitude of streams is (hint: look at the Bird and Hale slide of drainage patterns, 2<sup>nd</sup> row): **parallel**

Given there are streams around A and very few around B, the soils of B have **better / poorer** drainage and are **coarser (more sand) / finer (more clay)** than the soils around A.

2. Depressions such as at A are filled with **water / soil / vegetation** and indicate the underlying material is **permeable / impermeable** and the underlying drainage is **good / poor**.

3. In the upper portion of the left photo, the land cover represented by the bright toned areas is: **bare rock**  
The dark lines passing through these bright areas are (name two land cover types): **vegetation, water**

What is the name of the drainage pattern represented by these dark lines intersecting at 70-90°? **rectangular**.  
This pattern indicates **faults (and dykes) / drainage canals / ridges from folding of rock** that are commonly present in igneous rock composed of granite.

Describe how rainfall hitting the bright areas of this landscape drains from it. **Rock is impermeable, so it runs off into linear depressions and then along the depressions into water bodies**

**FOLDER 4 EROSION:**

1. The white tones in the bottom portion of the photos are caused by wind. What are they? **Blowouts**. The soil is dominated by **sand / silt / clay / till**. The soil at these locations is **stable / unstable**.
2. In the upper right there has been a landslide (even though the land is flat, it was probably because the soils are mostly clay). The landslide area can be approximated by an ellipse of major diameter about 60 mm and minor diameter about 40 mm on the photo. The average depth of mud was 3 m. About what volume of mud in m<sup>3</sup> moved in this slide (round to the nearest m<sup>3</sup>)? The photo scale is 1:10,000. **(2 marks)**.

- Hint: 1<sup>st</sup> convert the dimensions on the photo to ground distance in metres. Then, look up the formula for the area of an ellipse (note it uses radii; i.e. ½ of your dimensions by ½) and calculate its

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ground area. Then, multiply by the depth to get the volume of mud.

Radii:  $20\text{mm} \times 10,000 = 200\text{m}$  on ground;  $30\text{mm} \times 10,000 = 300\text{m}$  on ground

Area of ellipse =  $\pi R_1 R_2 = 188,495.6 \text{ m}^2$

Volume =  $3\text{m} \times 188,495.6 \text{ m}^2 = 565,486.8 \text{ m}^3$

3. What happened to the river at A? disappears underground.

This erosional feature is common in limestone. What is it? If you know where Warsaw, Ontario is, you should know this answer. Caves, underground channels.

4. The general image texture, especially evident around A, is mottled, and the drainage pattern is deranged, both indicating the soil is a glacial till. However, there is another "parallel" drainage pattern evident in the gullies such as those at B. The gullies at B are C (F)-shaped, indicating that this till is dominated by fine grained soils such as clay.

**FOLDER 5 TOPOGRAPHY:**

1. The topography is undulating / rolling / crested / blocky.

The broad C-shaped gully just below A, the topography you identified above, and the low intensity farming indicate that these soils are dominated by gravel / sand / silt / clay.

2. These photos are of Thunder Bay, Ontario. The topography to the left of A is: flat / undulating / rolling / blocky / crested. This typically when a very hard, non-erodible rock (in this case diabase, a type of igneous rock) is at the surface. While the surrounding rock gets eroded over time, the harder rock remains forming elevated terrain.

3. The overall topography, apart from the stream channels is flat / undulating / rolling / blocky / crested.

The lack of visible drainage pattern indicates the surface soil is coarse / fine with good / poor internal drainage. These characteristics are typical of ablation moraines (see next lecture/lab).

4. The topography is flat / undulating / rolling / blocky / crested.

This topography is caused by (circle all that apply):

glacial till / igneous rocks / sedimentary rocks / differential erosion between layers / tilting of the layers

The white object in the centre is a glacier.

It indicates the climate is cold / warm / wet / dry.