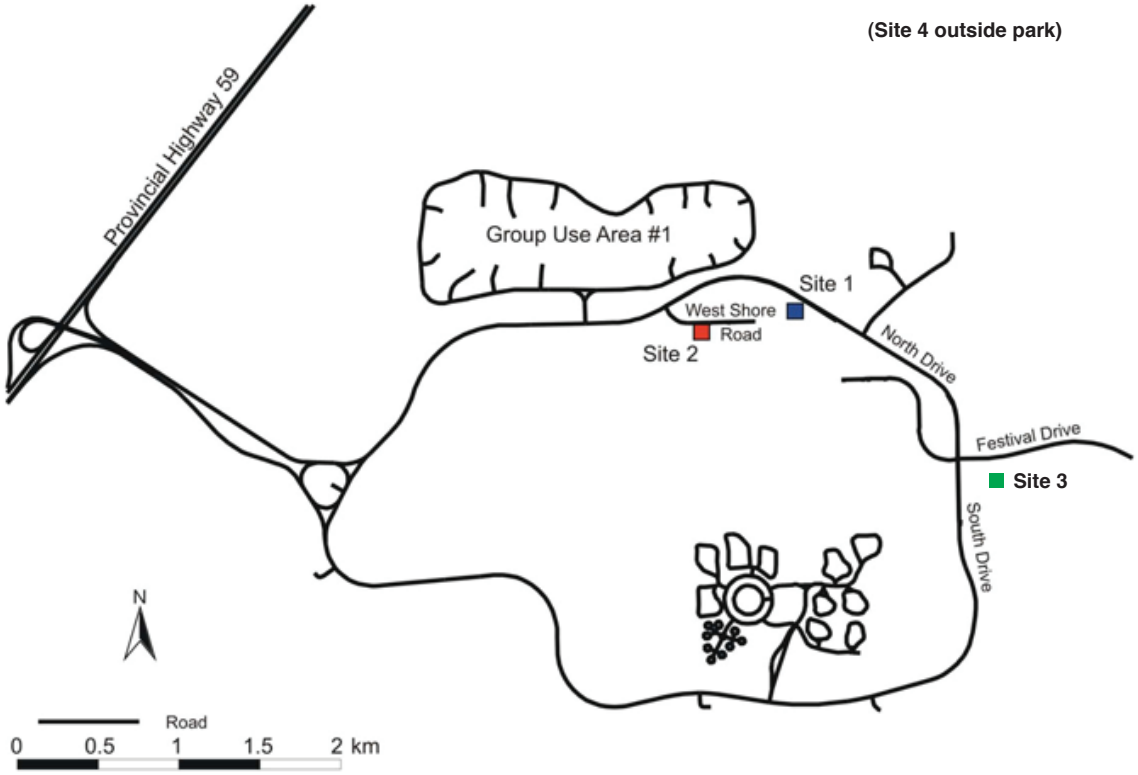
University of Manitoba
2015 Geophysics Field School

Birds Hill Project: Day 1 or 2 (April 28 or 29)
EM Induction Survey



Schedule: Group 2 (Site 2), 28th, morning; group 3 (Site 3), 28th, afternoon.; group 1 (Site 1), 29th, morning. Allow about 2.5 hours for data collection.

Goals: Birds Hill is an esker complex, with a sandy composition very different from the rest of the Red River valley. Today you will characterize its electrical conductivity, familiarize yourself with Geonics EM31 and GSSI Electromagnetic Profiler instruments, and practice laying out a grid.

Table 1. Equipment required for Birds Hill EM surveys		
No.	Item	Specific components
1	EM31	Instrument and case
		Manual
		Spare batteries
		Clips for transmitter and antenna (should be in the case)
		Screwdriver for adjustments (should be in the case)
2	Profiler	Instrument and case containing all accessories
		Manual
		Spare batteries for PDA (4 AA batteries)
3	Surveying	Tripod and level
		2x100 m tape and 4x50 m tapes
		GPS
		Pin flags (~50) and wooden stakes (4)

A. PRE-SURVEY INSTRUCTIONS

1. Read these instructions in full prior to the survey.
2. Briefly familiarize yourself with the instruments and their manual. s
3. Do a battery check on the EM31 and if necessary replace the batteries. Record the results.
4. Prepare tables for entering data into your log books. Tables should have entries for the Line, Station, Reader, Vertical dipole reading, Horizontal dipole reading, and Comments.
5. Check that your GPS unit is switched to UTM coordinates.
6. Ensure that your compass is set to the correct declination. The declination may be found at http://geomag.nrcan.gc.ca/calc/mdcal-eng.php.
7. Pack all necessary equipment carefully into one vehicle.

B. FIELD SURVEY INSTRUCTIONS

You will be completing several instrument procedures and tests and completing surveys with the EM31 (and profiler, as time allows) instruments. Group 1 will be completing a profile survey and Group 2 a grid survey. Divide into subgroups to complete the actual survey (questions 7 to 8) and rotate between these groups. The group will work on the project together and the data collection will be evaluated using the log books containing the survey details and measurements. Arrange to use a maximum of three log books to record all of the data. The log books are due in at 10:00 PM.

INSTRUMENT PREPARATION

1. Assist the instructor go through the nulling and phasing of the EM31 instrument. The procedure should be recorded in one person's logbook along with the details to be recorded for questions 2, 3 and 4.

2. Record all instrument details and survey configuration details.

PROFILE AND GRID LAYOUT

3. Lay out a 50 m by 50 m grid within the survey area. Suggested positions: for Group 1, the southwest corner of the survey should be at 651900E, 5542820N and for Group 2, the southwest corner of the survey should be at 651330 E, 5542780 N. For Group 3, the northwest corner should be close to the road intersection.

4. Record the survey configuration using both GPS and non-GPS methods. For the GPS approach, measure and record the corners of the grid. Record the UTM coordinates, whether the GPS fix was 2D or 3D, and the accuracy indicated by the GPS. For the non-GPS approach, draw a detailed sketch map of the survey area so, if GPS is for some reason not available, the survey could be performed again in the future. Tie the area to fixed features (e.g. parking lot) using a compass and measuring tape. The map should show the directions the survey lines run in.

SURVEY PREPARATION

4. Examine the sensitivity of the EM31 instrument to pin flags. Place the instrument on the ground and move the pin flag near either end of the instrument and observe the change in readings. Check for sensitivity to any other magnetic or conductive material you may be carrying and remove this material if necessary.

5. Examine the sensitivity of the horizontal and vertical dipole mode EM31 responses to the height at which the instrument is carried. To do this, try repeated readings at a few sites with the instrument carried by all group members. Is there a significant difference?

SURVEY

6. Complete an EM31 survey along the grid using a 5 m station spacing and both vertical and horizontal modes.

7. Complete an Profiler EMP-400 apparent conductivity survey of the grid using frequencies of 15,000, 5,000, and 1,000 Hz. Do a vertical mode survey and if time permits a horizontal mode survey. Use the low carry handle, with the instrument between 12" and 20" above the ground. Use the stationary mode for recordings at individually defined locations. The correct configuration will be yLB. Experiment with optimal stacking parameters (deleting the last reading if necessary).

C. POST-SURVEY INSTRUCTIONS

1. Pack the vehicle carefully for the return trip, paying particular attention to turn off the instruments.
2. At the university return the equipment to Room 315 or 316 and inform the instructors of any problems with the equipment or of a need to add another set of batteries.
3. Place the Profile EMP-400 rechargeable batteries on charge (both the instrument and PDA)

Suggested format for data recording:

TABLE 1 EM31 SOUNDINGS					
Location & Instrument					
Line (m)	Station (m)	Operator	Horizontal (mS/m)	Vertical (mS/m)	Comments