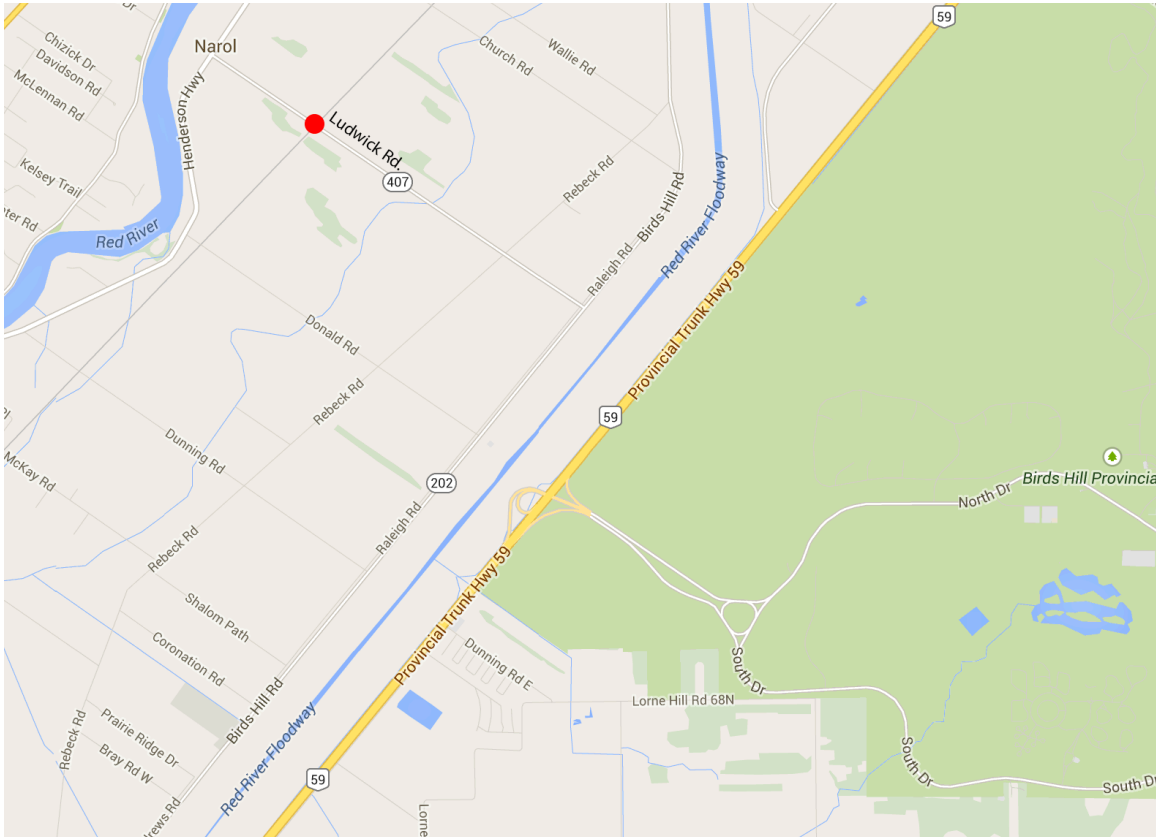


University of Manitoba  
2015 Geophysics Field School

Birds Hill Project: Day 2 or 3 (April 29 or 30)  
Magnetic and VLF survey



**Schedule:** Group 3, April 29<sup>th</sup>, afternoon; group 1, April 30<sup>th</sup>, morning; group 2, April 30<sup>th</sup>, afternoon. Allow about 2.5 hours for data collection. The site to be examined will be a set of train tracks crossing Ludwick Road (Hwy. 407); see red dot on map, above.

**Goals:** Birds Hill does not offer any targets for VLF and magnetic surveys. Instead, you will examine the instruments' response to a man-made conductor: a set of train tracks. *Be very attentive to the possibility of both vehicle and train traffic; safety vests are to be worn at all times.*

No.	Item	Specific components
1	GSM-19 (you may want to bring both units)	GSM-19 console
		Magnetometer sensors and staff etc
		Batteries
		Manual
2	VLF sensor	VLF sensor coil
		Carrying bracket
3	Scintrex Sm-2 Mag. Suscept. Meter	Instrument
		Operating instructions
		Spare batteries
4	Surveying	1 x 100 m and 2 x 50 m tapes
		1 Brunton compass
		2 wooden stakes and 20 pin flags
		GPS unit

## **A. PRE-SURVEY INSTRUCTIONS**

- 1. Read the project instruction sheets in full prior to commencing the survey.**
2. Familiarize yourself with the basic mode of setting the GSM-192 console, its battery check, and setting it for magnetic, magnetic gradient, or VLF-magnetic measurements. Check the frequencies of likely VLF transmitters.
4. Familiarize yourselves with the VLF (the "VLF dance"), magnetometer, and gradiometer reading procedures.
5. Examine the magnetic field forecasts at <http://www.spaceweather.gc.ca/sfst-2-eng.php>, checking the sub-auroral zone forecast.
6. Pack all necessary equipment carefully into the vehicle.

## **B. FIELD SURVEY INSTRUCTIONS**

You will be completing separate magnetic, magnetic gradiometer and VLF-EM surveys over 100 m long profile centered on a rail crossing. Pay particular to look out for trains and do not run any measuring tapes across the tracks. Safety vests must be worn at all times when working along a road. The group will work on the project together and the data collection phase will be evaluated using one or two log books, containing the survey details and measurements. The latter should have the data collection sheets taped into the log book. Include a sketch/map of the survey site in the log book.

1. Make a trial measurement of the magnetic field and magnetic field gradient in a relatively noise free location *i.e.* away from obvious conductors, power lines,

and ferrous objects. Each student should qualitatively assess the effects of their watch, key-chain, belt, cell phone or any other ferrous objects being carried on the reading and if necessary remove these items. Compare the response of the two magnetometers.

2. In order to assess magnetic and VLF field variations throughout the survey, establish a noise-free base station that can be re-occupied periodically. Take readings at this location every 30 minutes. For each base and survey station measurement you will need to record the location, time, reader, the magnetic or VLF-EM readings, and pertinent comments. Table 1 provides a suitable sheet. Also record the survey configuration using GPS measurements at the ends of the profile.

3. Complete a magnetometer plus gradiometer survey using a 100 m profile and a site spacing of 5 m. Record all survey and configuration details.

4. Examine the effect of changing the reader orientation by 180° on VLF-EM measurements.

5. Complete a VLF-EM survey along the 100 m profile with a 5 m site spacing.

### **C. POST-SURVEY INSTRUCTIONS**

1. Pack the vehicle carefully for the return trip.

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. Put the instrument batteries on charge.

*Possible format for magnetic data recording:*

Survey/Date Information						
Observations						
No	Site	Time	Reader	TMF (nT)	Gradient (nT)	Comments
1						
2						

*Possible format for VLF data recording:*

Survey/Date Information							
Observations							
No	Site	Time	Reader	Horizontal Field	Vertical In-phase	Vertical Quadrature	Comments
1							
2							