

LANDSLIDE RISK ASSESSMENT  
CENTRAL REGION

**SITE C7: KENILWORTH LAKE SLIDE**

LEGAL LOCATION: **NE 28-50-4-4**

REFERENCE LOCATION  
ALONG HIGHWAY: **Sta. 804+012**

UTM COORDINATES: **N 5,910,800**                      **E 532,788**                      (NAD83)

AI FILE: **H16:30**

AI PLAN & PROFILE: **W. of Jct. SR893 – W. of Kitscoty, Sheet 3 of 8**

Date of Initial Observation: **May 1977**

Date of Previous Inspection: **March 1998**

Inspected By: **AGRA Earth & Environmental Ltd.**

Date of Current Inspection: **May 26, 2000**

Inspected By: **Klohn-Crippen Consultants Ltd.**

Instruments Installed: **2 standpipe piezometers, 2 slope inclinometers (1980)**  
**2 standpipe piezometers, 3 slope inclinometers (1985)**  
**Crack pins (1986)**  
**7 pneumatic piezometers, 3 slope inclinometers (1986)**

Instruments Operational: **7 pneumatic piezometers, 3 standpipe piezometers (2000)**

Date of Last Reading: **April 5, 1988 (slope inclinometers)**  
**August 23, 2000 (piezometers)**

Read By: **Alberta Transportation and Utilities/Klohn-Crippen**

Risk Assessment: **PF(9) \* CF(4) = 36**

Last Updated by: **Klohn-Crippen Consultants Ltd.**  
Date: **August, 2000**

### Location and General Description of Instability

The slide is located south of Highway 16 about 2 km East of Islay Junction (about Sta. 804+12) along the north shore of the now dry Kenilworth Lake. The shoreline is located about 60 m from the highway and has a vertical elevation difference of about 15 m (about 4H:1V slope). The slide was first observed in 1977 and had no effect on the highway except for some cracks along the shoulder. The slide appeared to take the form of a deep-seated rotational slide into the lake.

Remedial works constructed in 1980 included a dumped pit run gravel toe berm about 25 m wide and 50 m long. Twinning of the Yellowhead Highway past Kenilworth Lake was completed in 1990 or 1991 and followed the original highway alignment. In 1998, Highway 16 was re-paved, which included a nominal amount of additional fill at the crest of the slope to accommodate an increase in highway width. Patching on the shoulder was required in the fall of 1999, indicating that the slide is still active.

### Geotechnical Conditions

Underlying the highway fill is a 1.5 m thick layer of highly saturated organic material (peat). This is underlain by a 3 m thick layer of soft saturated silty clay (till) with moisture contents of about 25-35%. Liquid limits in this material varied mostly between about 45-75%, with an average of about 55%. Plastic limits varied between 15-30% with an average of about 20%.

Underlying the silty clay, a 9 m thick layer of medium plasticity sandy clay (till) was observed. Moisture contents for this material ranged from 15-25% with an average of about 20%. The range of liquid and plastic limits was similar to the overlying clay; however, high plasticity clay stringers were observed in the till. Laboratory testing on the sandy clay indicated effective strength parameters of  $\phi' = 17^\circ$  with  $c = 55$  kPa.

The clay deposits are underlain by a very dense uniform sand or sandstone of the Upper Cretaceous Belly River Formation

Instrumentation indicated that the water level was at about 1.5 m below the surface of the slope in the 1980's when the lake was present. Current water levels in the slope are unknown as the instrumentation was last read in about 1988.

Test hole logs, instrument installation summaries and additional information are provided in Section G.

### Chronology (Refer to Section G for Further Information)

May 1977

AGT reports a hill sliding problem which is endangering the phone cable.

July 1977

A site inspection indicates that the highway is not affected by the slide and that AGT should adopt an aerial installation for the cable.

March 1979

Site investigation: 2 holes were drilled, one in the ditch and one on the side slope. Typically, silty/sandy clay till was encountered.

April-May 1980

Site investigation: 4 holes drilled indicating that the silty/sandy clay till was underlain by dense sand/sandstone. 2 standpipe piezometers and 2 slope inclinometers were installed. These were drilled to the west (about Sta. 778+50 to 792+78) of the current slide area.

August 1980

Summary geotechnical report was prepared that recommended the provision of a toe berm along the lakeshore constructed of pit run gravel.

November 1980

Subsequent to a site inspection, the constructed toe berm was found to be of insufficient size and it was recommended that toe berm be armored with riprap over filter cloth.

December 1980

2 Dyna-cone tests performed.  
Muskeg probe survey undertaken on lake bottom.

October 1985

2 standpipe piezometers and 3 slope inclinometers installed. This investigation was conducted about 300 m east of the original slope movement and berm construction.

February 1986

Crack pins installed.

April 1986

7 pneumatic piezometers and 3 slope inclinometers installed. The installation records indicate that four horizontal drains had been installed prior to this date.

1988

Last record of instrument readings taken at this site.

1990 - 1991

Twinning of the Yellowhead Highway past Kenilworth Lake was completed in 1990 or 1991 and followed the original highway alignment. Regular patching of the pavement has been required since this time (about 1 load of asphalt every 1 or 2 years).

April 1998

A site evaluation by AGRA Earth & Environmental was prepared. A monitor and repair strategy was recommended and was subsequently adopted.

1998 - 1999

In 1998, Highway 16 was re-paved, which included a nominal amount of additional fill at the crest of the slope to accommodate an increase in highway width. Patching on the shoulder was required in the fall of 1999, indicating that the slide is still active.