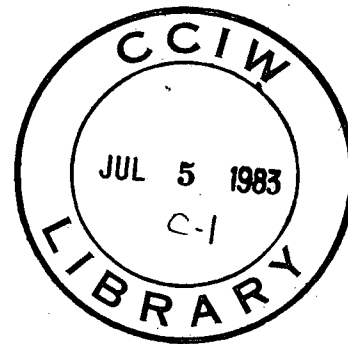


HYDRAULICS DIVISION

TECHNICAL NOTE



DATE:

May 1983

REPORT NO: 83-17

TITLE:

Shore Recession at Long Point Lighthouse

AUTHOR:

M.G. Skafel

REASON FOR REPORT: The Canadian Coast Guard requested that the Hydraulics Division accompany their personnel on a site visit to investigate the recession of the shoreline which has caused an immediate threat to the lightkeeper's house.

CORRESPONDENCE FILE NO: 1200

Observations

The lighthouse station was visited on 26 April 1983 via Coast Guard helicopter, at the invitation of Dr. C. Fisher, Coast Guard. The station was approached by flying along the point from Port Rowan. The south shore was breached in several places, some 20 km from the tip, in an area where breaching is relatively common. On the north side, in the vicinity of the lighthouse, the shoreline has retreated so that a corner of the foundation of the lightkeeper's house is no longer supported, and is in the swash zone. The groynes installed in 1978 were, with one exception, awash or submerged, and not connected to the present shoreline. This situation contrasts with that observed by Coakley, Dick and Skafel in 1978 when the groynes were all connected to the shore and had a freeboard of about 0.3m. (Based on monthly mean water levels the water level was 0.1 to 0.2 m higher during the 1983 visit. There has been no net accumulation of sediment since 1978 in the groyne field, although the groynes may have retarded the recession of the shoreline.

Wave Climate

In a previous report (HD Technical Note 78-15)* waves from the northwest, northeast and east were considered important for littoral transport on the north side of the point. In discussions with the lightkeeper, he pointed out that there was substantial wave action on the north shore in the vicinity of his house during strong winds from the southwest. The waves approached from the right of normal to the beach, and would thus tend to move material to the west. (This would increase the erosion described in TN78-15).

* Coakley, J.P., T.M. Dick, and M.G. Skafel 1978 "Littoral Process and Shore Protection Options in the Vicinity of the Long Point Lighthouse, Lake Erie", NWRI Hydraulics Division Technical Note 78-15.

Events with strong southwest winds are usually completed with the wind veering to the west and northwest before decreasing, so that the last action on the north shore is waves from the northwest resulting in some easterly transport.

Water Levels

Examination of the maximum monthly mean water levels (Port Colborne) for each year since 1972 shows that the water levels have remained high throughout this period. This is the time during which there has been considerable recession in the vicinity of the house. The average of the maximum monthly mean water level from 1972 to 1981 is 174.51m (standard deviation 0.16) (The all time high monthly mean was 174.79m in June 1973). The month of occurrence varied from May to August. The highest all time average monthly mean water level occurs in July and is about 174.1m. The high water levels of the last decade are thus substantial above the long term average. In contrast, the water levels were below average in the 1920's, 1930's and 1960's. Due to the gentle slopes and low relief, high water levels aggravate the flooding and erosion during storm surges.

Foundation Material

A general description of the subsurface material is given on the attached figure, prepared by J. P. Coakley, using information from four boreholes and two wells. In the vicinity of the lighthouse there is at least 15m of sand on top of 20 to 40m of silt. Bedrock is about 120m below chart datum near the tip of Long Point.

Discussion

The north shore of Long Point near the lighthouse is in a zone of erosion, as described in T.N. 78-15. The erosion processes described in that report are aggravated by southwest winds which cause flooding and considerable wave action on that shore.

The continued high water levels have prevented any natural relief from erosion. The erosion of the past decade seems closely linked to the higher than normal water levels. It is not possible to predict when lower levels might return, providing natural relief from the erosion.

The groyne field has provided some temporary protection and has lasted about as long as forecasted in the previous report. The forecast was based on estimated recession rates without the groynes, so it would appear that the groynes did not appreciably slow the recession of the shoreline.

Alternative solutions such as artificial beach nourishment or portable housing appear to be the only approaches left. Given that, by nature, Long Point is a very dynamic feature, it will be necessary to monitor the situation year by year and maintain a flexible approach to the problem.

LONG POINT SUBSURFACE SEDIMENTS

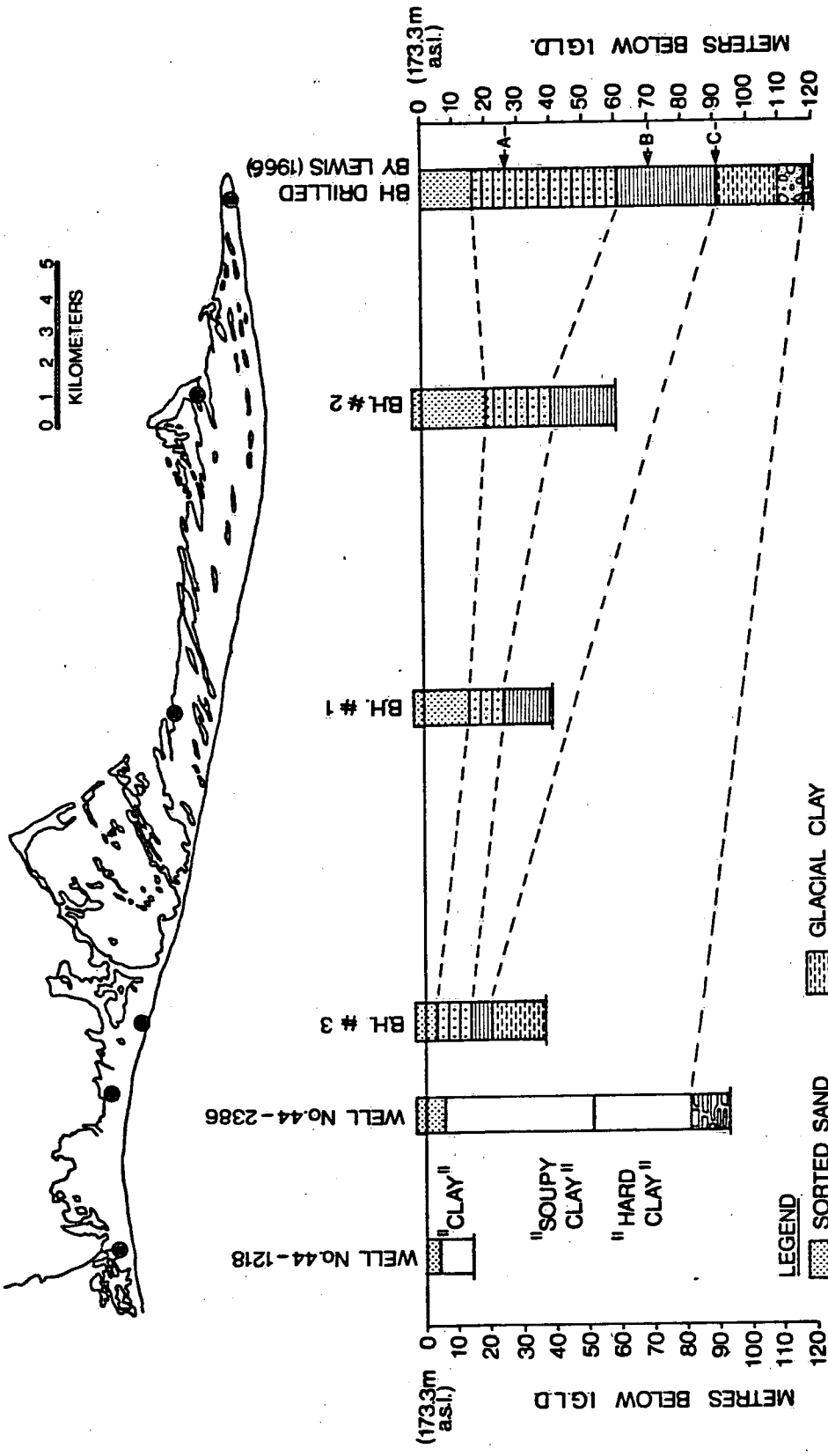


Figure 1 Location of all boreholes on Long Point (top) and an interpretative cross section (bottom) showing vertical distribution and inferred spatial correlation of sedimentary units. Age estimates shown beside the Lewis borehole are based on pollen data (A, B) and on the presumed age of Early Lake Erie (C).

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