Shoreplan Engineering Limited
20 Holly Street, Suite 202
Toronto, ON Canada M4S 3B1
T) 416.487.4756 F) 416.487.5129
E) mail@shoreplan.com

June 28, 2021

SHOREPLAN

Mr. Mike Pettigrew
The Biglierri Group
20 Leslie Street, Suite 121
Toronto ON M4M 3L4

Re 591 Liverpool Road, Pickering
Our File: 19 - 3112

Dear Mr. Pettigrew:

This is an update to our May 31, 2021 assessment report. It is a follow up to our September 16, 2019 assessment of the long-term stability of the barrier beach fronting the proposed development site 591 Liverpool Road, Pickering (the "site"). That letter was produced as part of an effort to define the scope of a natural hazards assessment for the development site. It has been, and continues to be, Shoreplan's opinion that the Frenchman's Bay barrier beach is dynamically stable and provides wave protection to the site. TRCA is concerned that the site would be vulnerable to erosion should the barrier beach disappear. TRCA's coastal consultant has suggested that the beach is being eroded at a rate of approximately 0.5 metres per year. Their consultant recommended that the position of the historic shoreline be plotted, going as far back as 1970.

We carried out an analysis as suggested by TRCA's coastal consultant and found nothing to suggest a long-term average recession rate in the order of 0.5 metres per year. It is still our opinion that the proposed development site does not require an erosion hazard assessment with regard to open Lake Ontario erosion processes.

We obtained aerial photographs for sixteen years between 1930 and 2020 and digitized the shoreline on both the lake and marsh sides of the barrier beach east of the entrance to Frenchman's Bay. Photographs for 1930 to 1999 were obtained from the Natural Resources Canada's National Air Photo Library (NAPL). Orthorectified aerial photographs for 2000 to 2020 were obtained from First Base Solutions. The NAPL photographs were manually georeferenced using the 2016 orthophoto as a base reference.

Three transect lines were extended across the barrier beach: a central transect at the end of Liverpool Road, and transects 200m on either side of the centre transect. The transects were extended lakeward, starting at arbitrary points within the marsh. Figure 1 shows the location of the three transects as well as the digitized shorelines.

Offset distances to the digitized shorelines were measured and tabulated, as shown in Table 1. The marsh side of the centre transect was not measured

because the shoreline is fixed by a bridge that was present in all aerial photos. Plots of the measured offsets were prepared to show the progression of the beach shoreline over time. Average annual water levels and the water level on the day the aerial photographs were taken were added to the plots. Water level data was taken from the Canadian Hydrographic Service gauge in Toronto Harbour. The plots for the east, west and centre transects are shown in Figure 2 to Figure 4, respectively. These plots show an overall relatively stable barrier, exhibiting dynamic response to varying water levels and presumably varying wave conditions.

The plots in Figure 2 to Figure 4 suggest some pattern of the beach response to water levels. This was further investigated by producing the linear regression trend line plots shown in Figure 5 to Figure 7. These plots show that as the water level increases, there are clear trends that:

- the distance to the marsh shoreline increases,
- the distance to the lake shoreline decreases,
- the subaerial width of the barrier beach decreases.

This is the normal response to be expected with an increase in water level and is not an indication of long-term recession.

Our 2019 assessment noted changes in water levels will impact the profile of the beach. Water levels in 2017 and 2019 exceeded the design high water level at this location and impacted the beach profiles. Although these water levels were unprecedented and may represent future design high water levels, the conditions did not cause any breaches of the barrier beach. Despite three years of severe conditions, the barrier beach continues to provide protection for the marsh and the lands beyond.

This current analysis supports our previous opinion. While the east beach exhibits dynamic behaviour, there is no indication that there is ongoing erosion to the point that the beach will disappear within the next 100 years. Our analysis covered a period of 90 years. It is still our opinion that the proposed development site does not require an erosion hazard assessment with regard to open Lake Ontario erosion processes.

Yours truly,

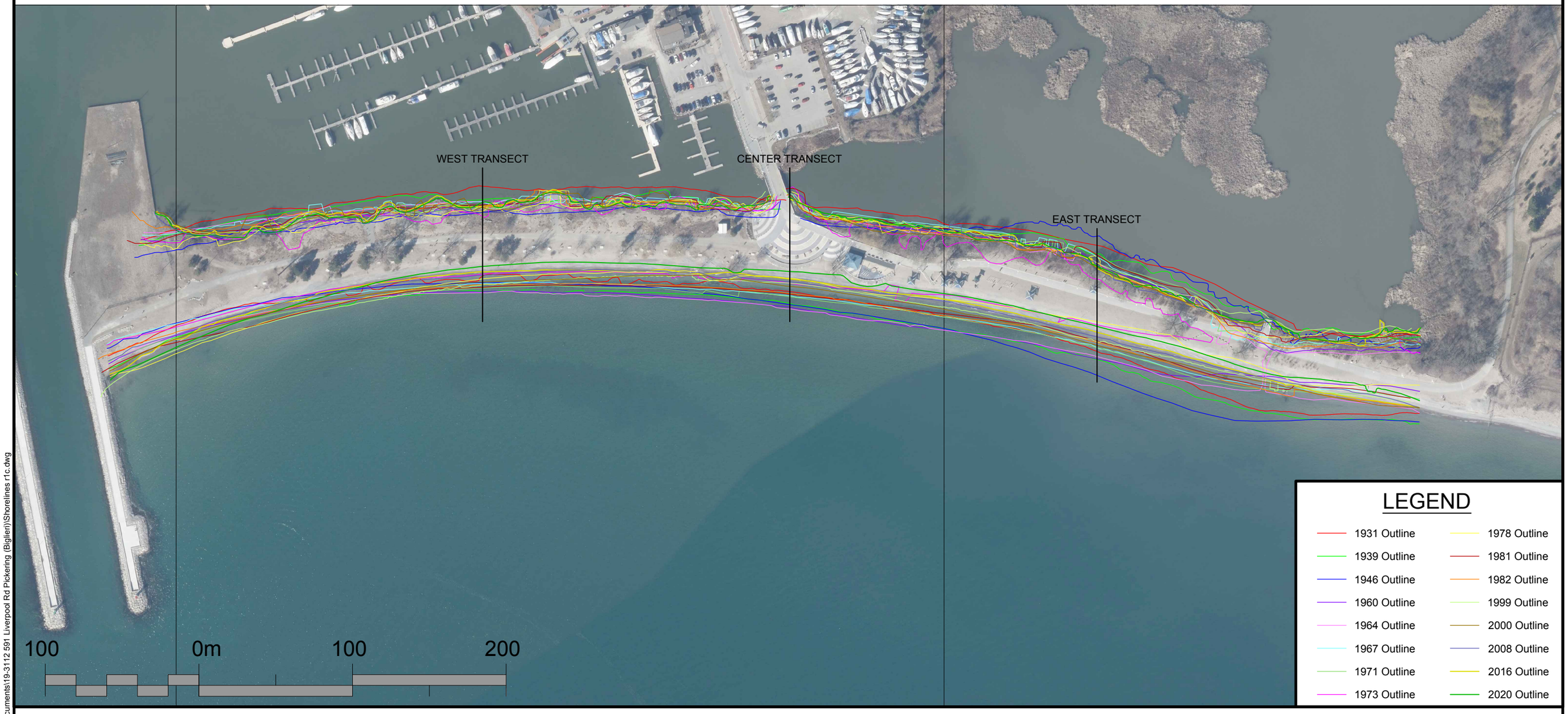
Shoreplan Engineering Limited

M. Sturm, P. Eng.

Bruce Pinchin, P. Eng.

Table 1 Measured Shoreline Offsets

Year	Distance to Digitized Shoreline (m)				
	East Transect		Centre Transect	West Transect	
	Marsh	Lake	Lake	Marsh	Lake
1931	11.0	80.0	80.5	11.9	70.5
1939	16.4	85.2	88.1	20.5	80.5
1946	5.0	95.6	89.0	28.9	74.7
1960	22.0	84.9	90.7	25.0	80.6
1964	22.4	83.3	91.7	22.4	81.2
1967	18.5	77.5	83.2	21.9	75.1
1971	16.9	77.5	83.8	25.7	78.1
1973	32.8	62.6	75.0	31.6	69.1
1978	18.4	60.7	71.8	28.1	72.2
1981	17.1	73.2	82.1	24.1	77.7
1982	22.1	74.2	81.7	25.6	75.8
1999	22.4	73.5	75.0	26.3	76.1
2000	25.4	76.0	77.1	25.9	74.2
2008	23.6	70.5	74.2	28.9	69.8
2016	25.7	67.5	72.3	24.9	67.6
2020	24.4	63.7	67.4	22.4	64.1



Project #19-3112
Scale 1:2500
SHOREPLAN

Figure 1
Site Plan

Drawing Location: C:\My Documents\19-3112 591 Liverpool Rd Pickering (Biglieri)\Shorelines r1c.dwg

Figure 2 Shoreline Offsets and Water Levels, East Transect

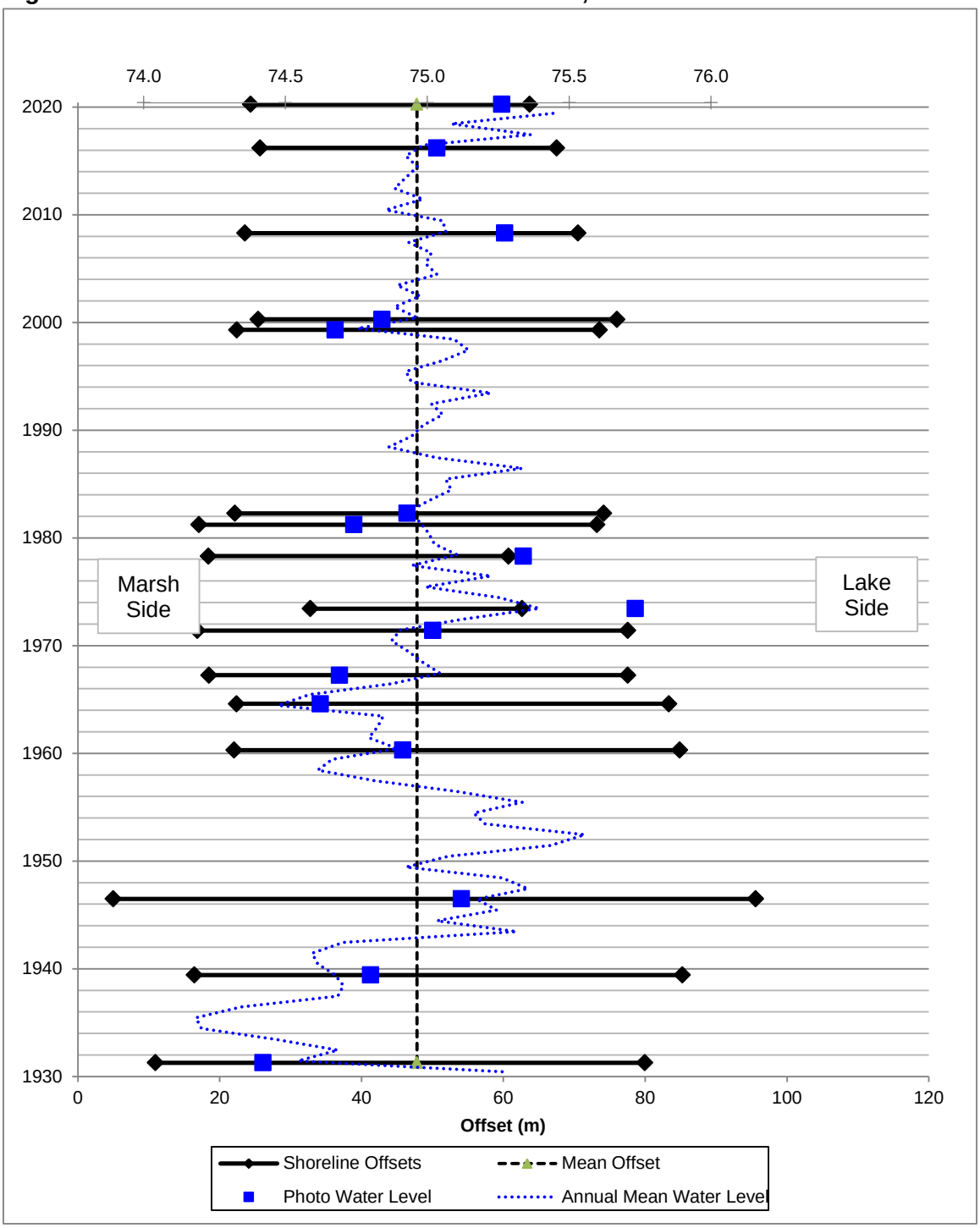


Figure 3 Shoreline Offsets and Water Levels, West Transect

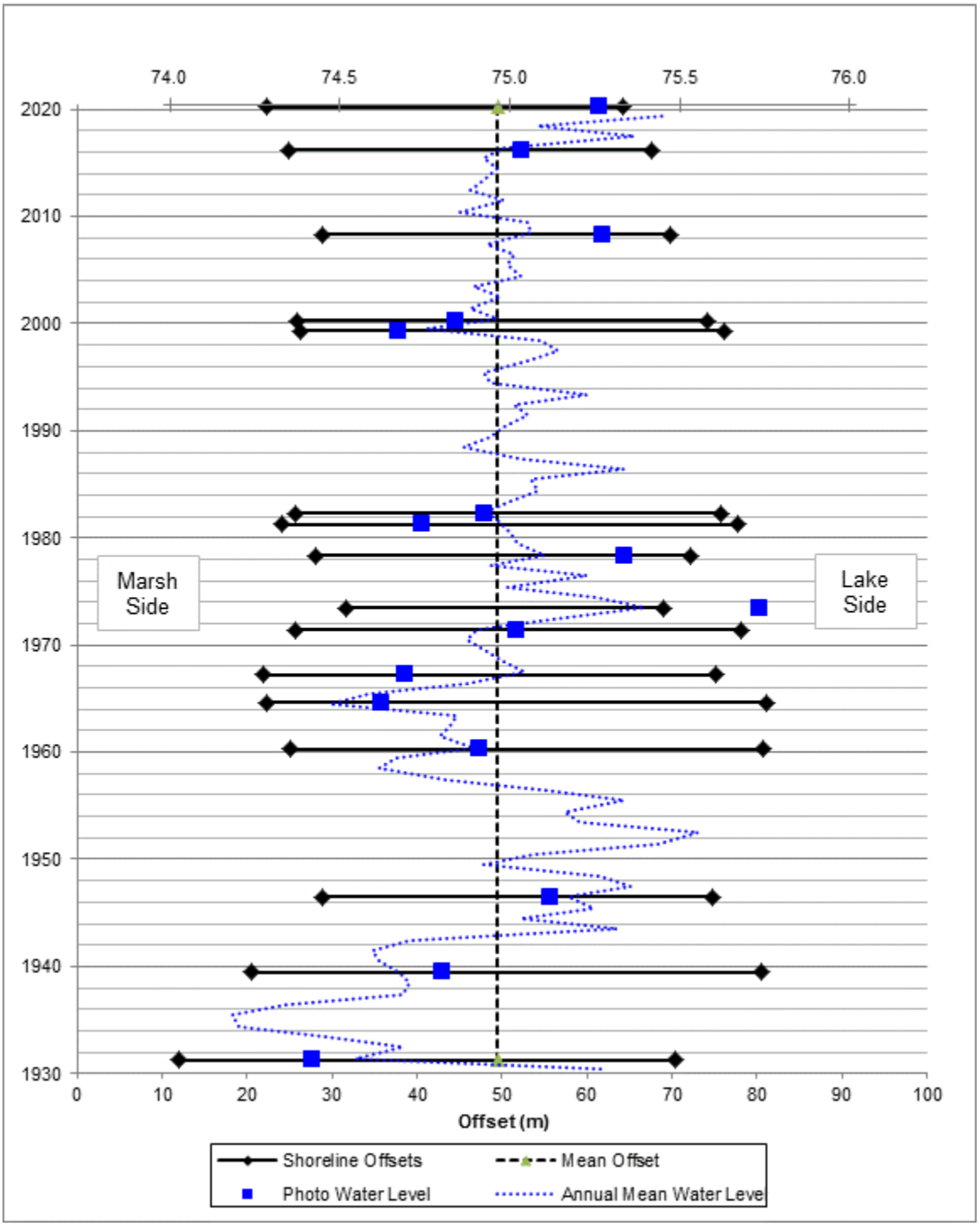


Figure 4 Lake Shoreline Offset and Water Levels, Centre Transect

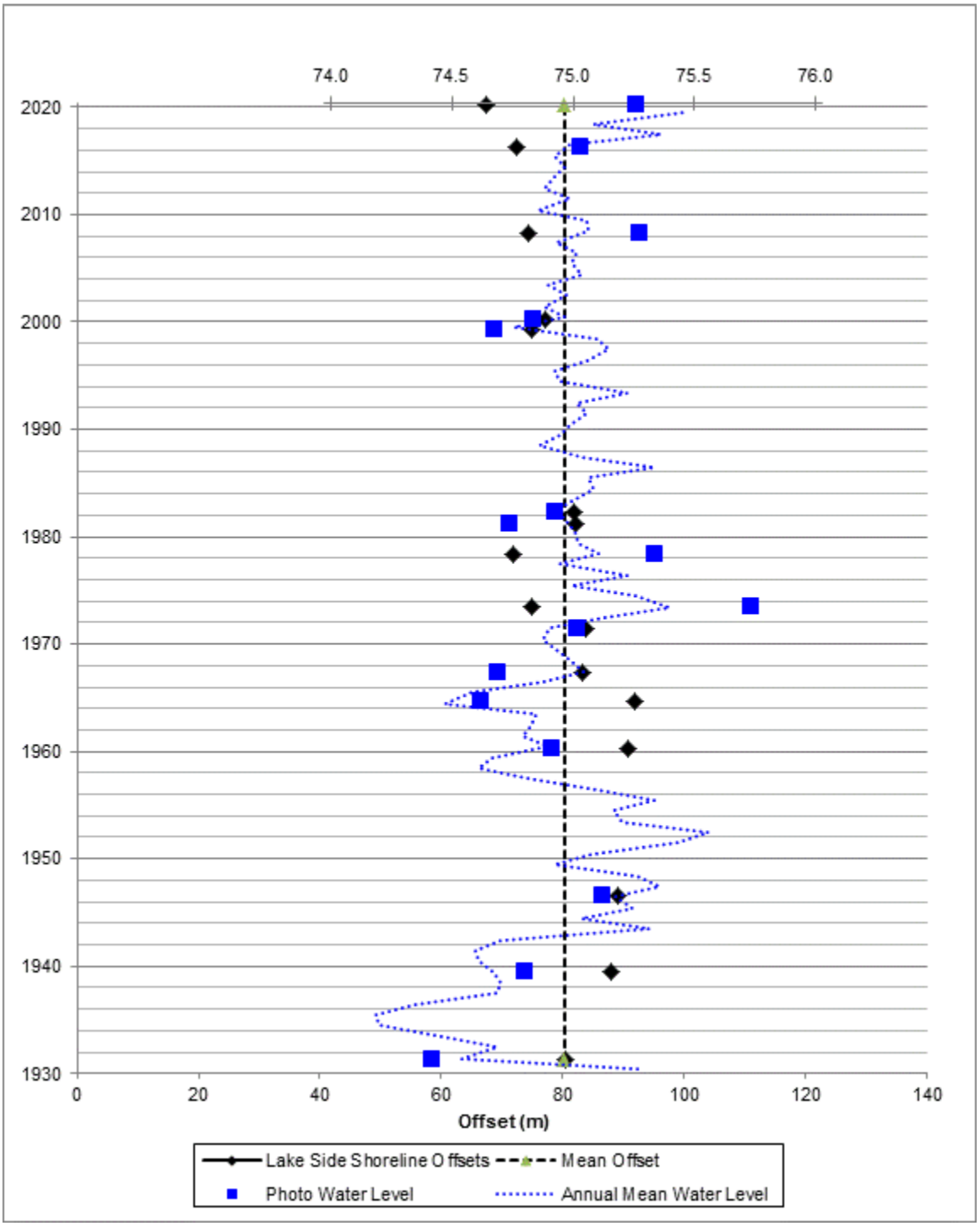
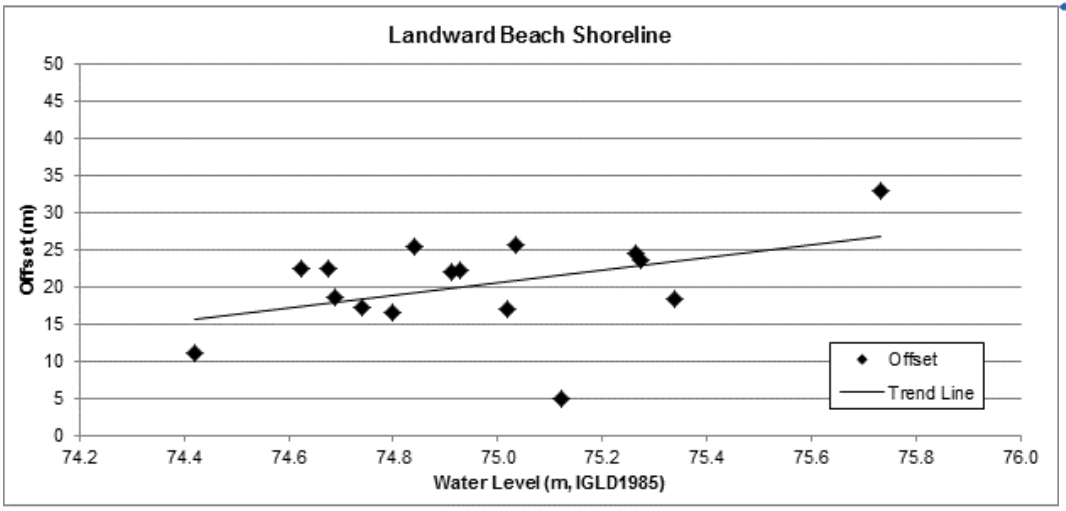
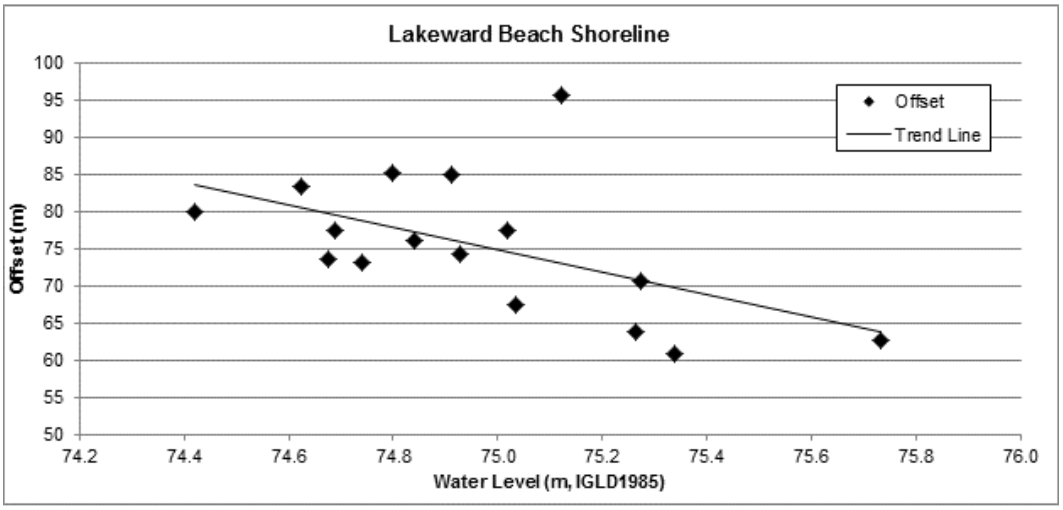


Figure 5 Shoreline Position Trend Lines, East Transect





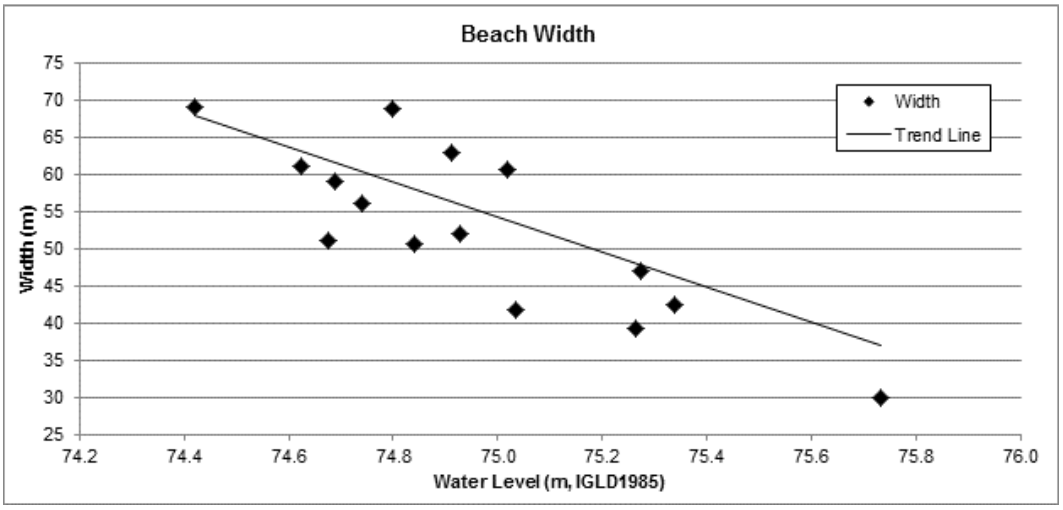
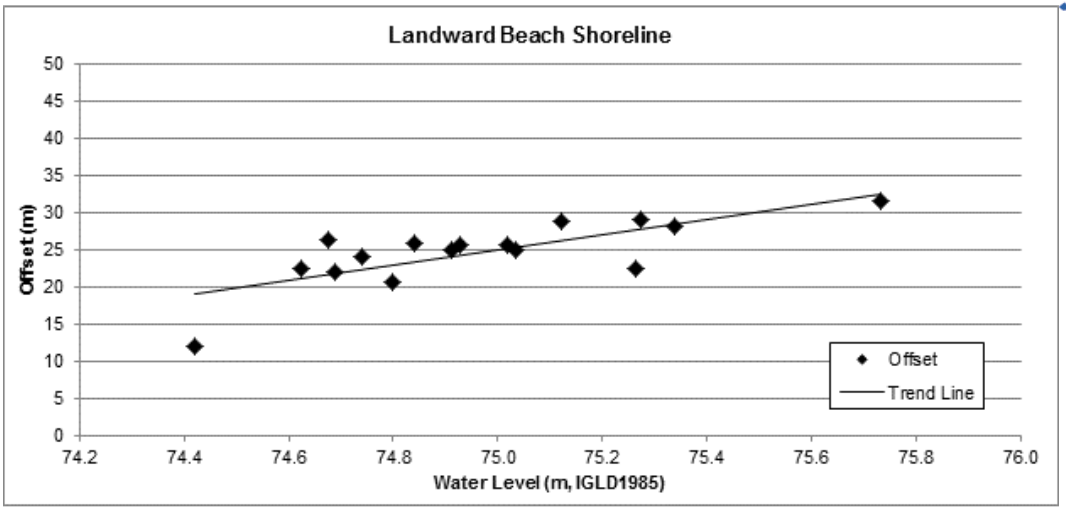
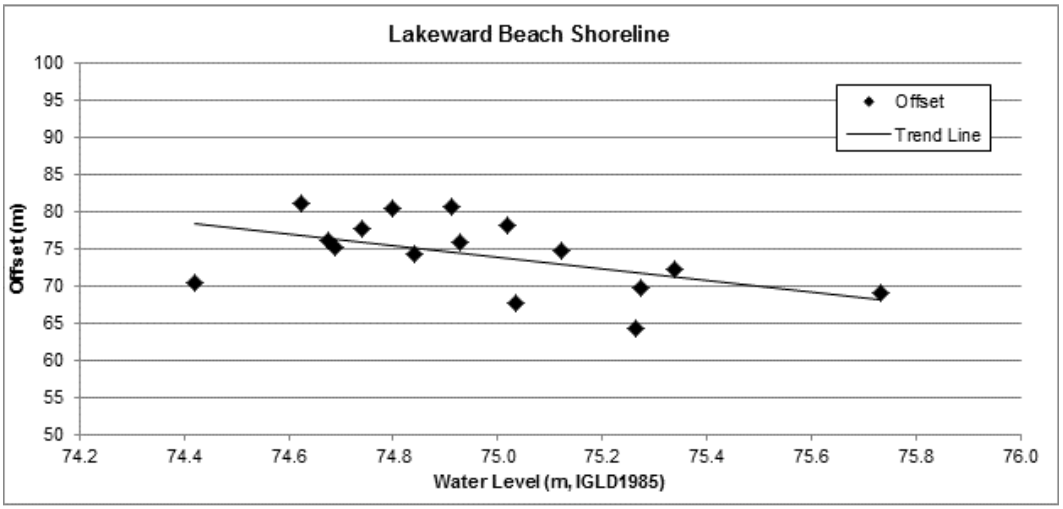


Figure 6 Shoreline Position Trend Lines, West Transect





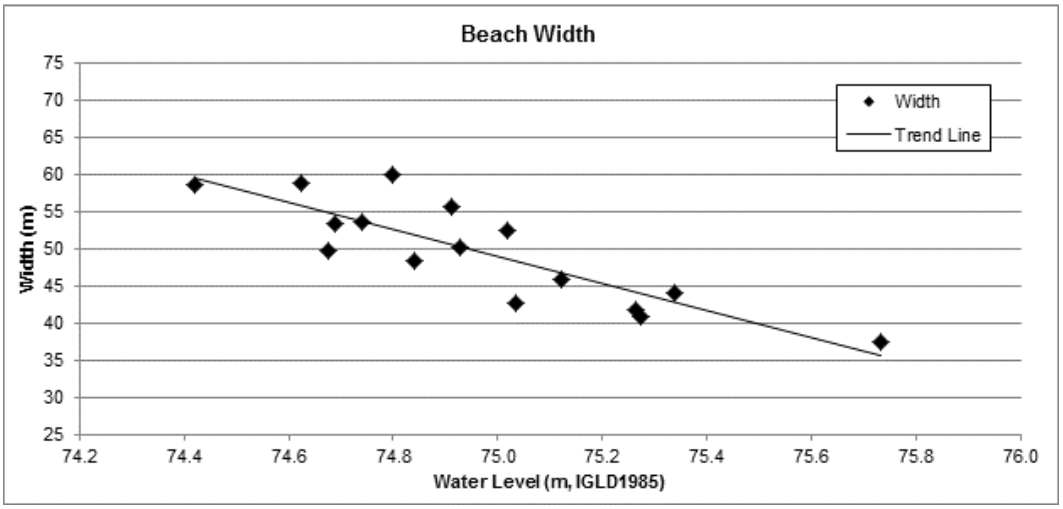


Figure 7 Lake Shoreline Position Trend Line, Centre Transect