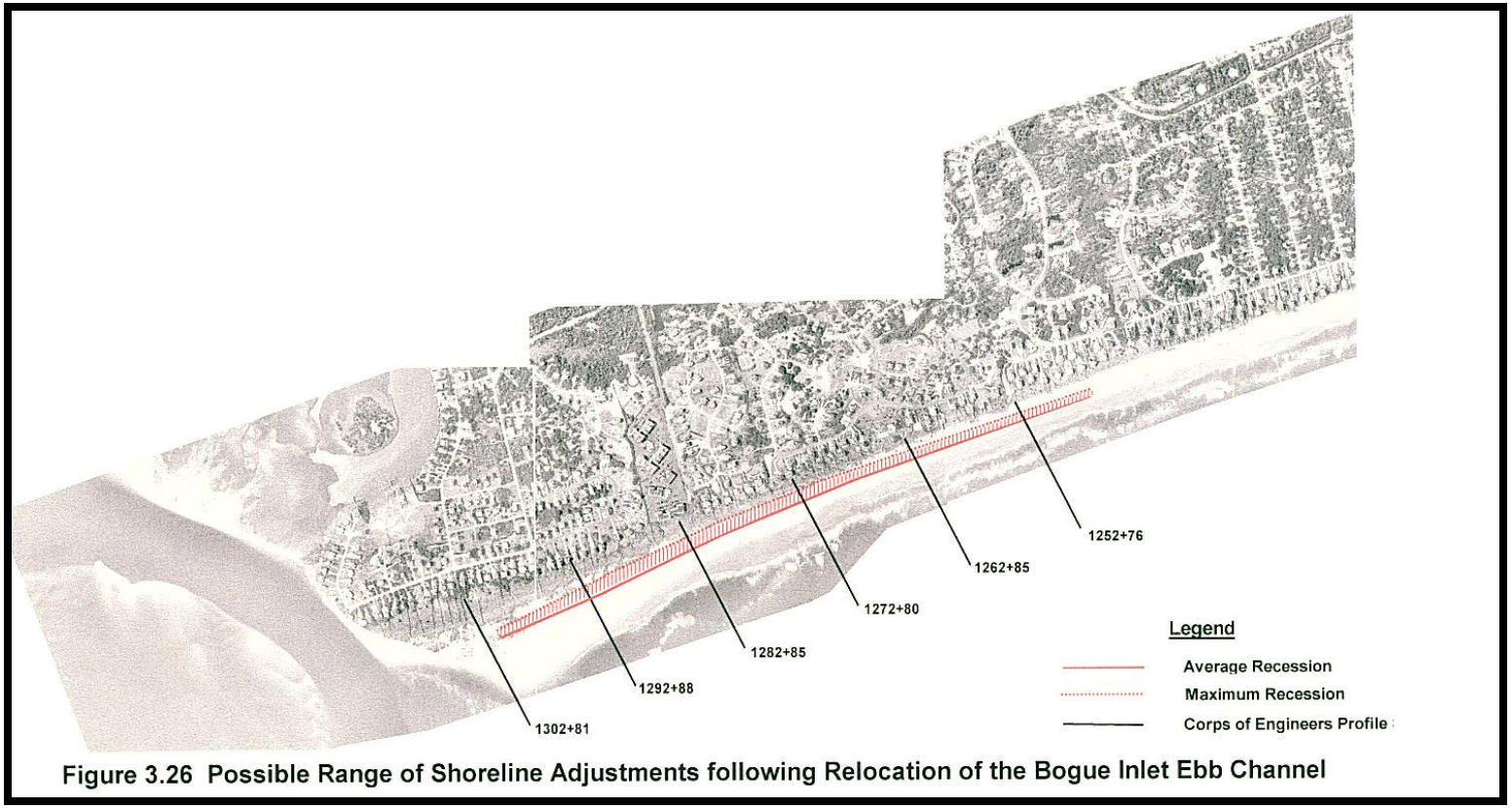

Figure 3.26 Possible Range of Shoreline Adjustments following Relocation of the Bogue Inlet Ebb Channel

3.26. Estimated Volumetric Erosion – Emerald Isle. The Corps of Engineers obtained offshore profiles along Bogue Banks in April 2001. Six of the profile stations were in the area expected to undergo adjustments following the relocation of the Bogue Inlet ebb channel. The approximate locations and numbering of these six profile stations are shown on Figure 3.26 with plots of the profiles provided on Figure 3.27. Profile station 1252+76 is located near the east limit of expected shoreline adjustments and appears to be outside the influence of the Bogue Inlet ebb tide delta. Accordingly, the shape of the profile at station 1252+76 was used to represent the shape that the other profiles would assume following the channel relocation. The adjusted profile at the other 5 stations was estimated based on the predicted erosion of the shoreline following the channel relocation. For example, station 1262+85 is located in an area where the shoreline adjustment is expected to range between –10 feet and –80 feet (transects 1 to 5). Since station 1262+85 is located approximately midway between transects 4 and 5, the adjusted shoreline was assumed to be 80 feet landward of the existing shoreline. Therefore, the 0-foot NGVD elevation on the adjusted profile (profile 1252+76) was positioned 80 feet landward of the 0-foot NGVD elevation on the existing profile. Adjustments in the location of the 0-foot NGVD elevation applied at the other profile stations were: -150 feet for station 1272+80, -300 feet for station 1282+85, -350 feet for station 1292+88, and -400 feet for station 1302+81. The adjusted profiles for the 5 stations are shown on Figure 3.28. The volume of material represented by these assumed profile adjustments was estimated to be 2,065,000 cubic yards.

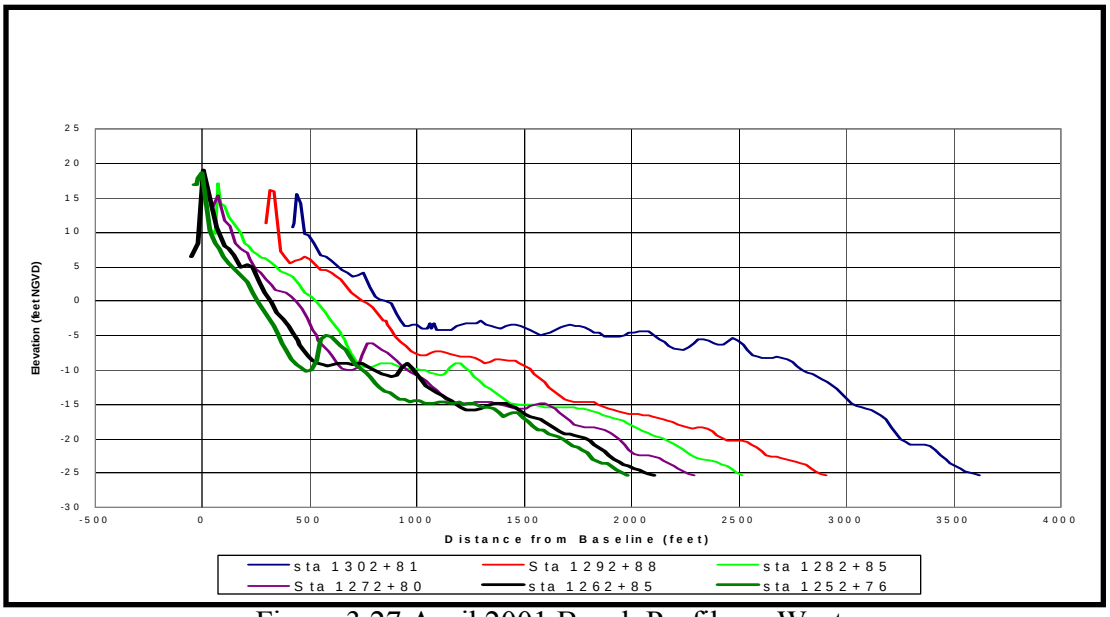

Figure 3.27 April 2001 Beach Profiles – West

3.27. Time Required for Shoreline Adjustments on the West End of Emerald Isle. Erosion and redistribution of this rather large volume of material will obviously take a

considerable amount of time. However, not all of this material would be transported out of the area by longshore transport processes since approximately 1.5 million cubic yards (located between baseline stations 1282+85 and 1302+81) is associated with the portion of the ebb tide delta that would be abandoned following the relocation of the channel. The remaining 565,000 cubic yards to be redistributed is located between baseline stations 1252+76 and 1282+85 or along the east end of the shoreline adjustment area outside the direct influence of the ebb tide delta. Much of the ebb tide delta material will migrate onshore as soon as tidal currents holding it in place are eliminated. For the case without a dike (Scenario No. 1), the numerical model (model results discussed in Section 5) indicated that currents would remain rather high in the existing channel, which would slow the rate of onshore movement of the ebb tide delta material. For this case, the onshore movement of the 1.5 million cubic yards of material could take between 4 and 6 years. The residual tidal currents in the existing channel would slow the rate of development of the sand spit off the west end of Emerald Isle. If a dike is constructed across the existing channel (Scenario No. 2), the abandoned ebb tide delta material would be driven toward the shoreline at a relatively high rate with most of the 1.5 million cubic yards of ebb tide delta material expected to deposit in the seaward portion of the existing channel during the first 2 years following the channel relocation. In this regard, the volume of material required to fill the seaward portion of the existing channel is estimated to be around 1 million cubic yards.

3.28. The erosion of the 565,000 cubic yards of material situated east of baseline station 1282+85 would be controlled to some extent by longshore sediment transport process, particularly once the abandoned portion of the ebb tide delta collapses to the point that it no longer significantly impacts wave conditions on the west end of Emerald Isle. Accordingly, an estimate of the amount of time required for the shoreline east of baseline station 1282+85 to adjust was based on sediment transport rates in the area. Estimates of the sediment transport rates applicable to the Emerald Isle shoreline located outside the influence of Bogue Inlet, which are presented in Section 5 of this report, yielded an average net transport to the west of 272,300 cubic yards/year. Under existing conditions, i.e., with the influence of the existing ebb tide delta, sediment transport rates along the extreme west end of Emerald Isle are nearly in balance as evidence by the shoreline stability in this area. This means that the existing net rate of sediment transport west of baseline station 1252+76 is near 0. Once the influence of the ebb tide delta is removed, the alignment of the shoreline will begin to approach the same alignment as the shoreline farther to the east and the net sediment transport rate in this area will approach 272,300 cubic yards/year. With the net sediment transport rate west of station 1252+76 increasing from its present rate of near 0 to 272,300 cubic yards/year, the time required to remove the 565,000 cubic yards of material from the shoreline between stations 1252+76 and 1282+85 would be approximately 4 years. For the case without the dike closure of the existing channel, this 4-year shoreline adjustment period would be added to the 4 to 6 year adjustment period associated with the onshore movement of the ebb tide delta material resulting in a total adjustment period without the dike of 8 to 10 years. Closure of the existing channel with a dike will accelerate the ebb tide delta adjustments to around 2 years, therefore, with the dike, the total adjustment period is expected to be around 6 years.