The U.S. Army Corps of Engineers
Philadelphia District

The Atlantic Coast of New Jersey
Regional Sediment Budget
1986 - 2003
Cape May Point to Manasquan Inlet

Final Report
March 2006

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INTRODUCTION

The U.S. Army Corps of Engineers, Philadelphia District as part of the New Jersey Alternative Long-Term Nourishment Study (NJALTN) study developed a regional sediment budget from Cape May Point to Manasquan Inlet. The study area is approximately 100 miles in length, encompasses ten inlets, eight barrier islands, the Cape May Peninsula, and the land mass of Island Beach (Manasquan Inlet to Barnegat Inlet). This sediment budget will be coupled with a sediment budget from Manasquan Inlet to Sandy Hook that is being developed by New York District to form a single regional sediment budget for the entire Atlantic Ocean Coastline of New Jersey. The regional sediment budget was created with the software tool SBAS 2004, (Sediment Budget Analysis System) which was developed by the USACE Engineering Research and Development Center (ERDC).

A sediment budget represents an accounting of all sediment movement, both natural and mechanical, within a defined area over a specified time. The defined area is represented by a series of control volumes. Each control volume represents an area of similar geographical and littoral characteristics. Individually each control volume can be viewed as a complete self-contained sediment budget within its own boundaries. Sediment fluxes connect each control volume to one another and they represent either a sediment source or sink to the control volume. Sediment sources are such things as beachfills, longshore transport, shoreline erosion, and inlet shoal growth. Sediment sinks are such things as longshore transport, shoreline accretion, dredging activities, and inlet shoal reduction. Sea-level rise can also be considered a sediment sink but it was not considered during the development of this sediment budget due to the fact that the period of analysis used was relatively short. A balanced sediment budget means that the sediment sources, sinks, and net change within each individual control volume equals zero. Also, a balanced sediment budget assumes that sediment can not be created nor destroyed within each control volume.

A balanced regional sediment budget can be a useful tool in investigating observed coastal changes and estimating future changes and management alternatives. It can also be a potential tool to help solve local sediment-related problems by designing solutions that take into account a regional strategy. The regional sediment budget developed as part of this effort represents potential sediment movement. It was assumed for this regional sediment budget that an “unlimited” supply of sediment was available, and that obstructions such as groins, jetties, and breakwaters do not impact the sediment pathways in any way. A more detailed analysis beyond what was done for this effort incorporating numerical modeling would be needed in order to take into account the effects of coastal structures on sediment transport pathways, especially in the vicinity of the ten inlets that are within the study area.

ANALYSIS PROCEDURES

Based on the availability of shoreline position and wave data, the specific period of analysis for the sediment budget was selected as 1986-2003. Shoreline position data was digitized from aerial photographs from 1986 and 2003 and used to determine shoreline erosion/accretion during this period. The wave data used was taken from the 1980 to 2000 updated WIS Hindcast of the Atlantic Ocean. Wave data was provided by the USACE, Field Research Facility and used for calculating potential longshore sediment transport. Additional input data used during the development of the sediment budget included:

Dredging records from the coastal navigation projects of Manasquan, Barnegat, Absecon, and Cape May Inlets.

Borrow area dredging records for the Federal Beachfill Projects at Absecon Island, Ocean City, Seven Mile Island, and Cape May City.

Quantities from Federal/State/Local beachfill projects compiled in a database developed by the District.

Inlet bathymetry surveys conducted by the District and its Contractors.

The study area of was divided into 28 control volumes (Table 1). In general, one control volume was established for each inlet and each barrier island/land mass. Additional control volumes were delineated at the known nodal points of Ocean City and Barnegat Light where the net sediment transport reverses direction. Additional control volumes were also delineated in areas where the shoreline angle changed abruptly. This occurred at Cape May City, Cape May Meadows, and Cape May Point. An additional control volume was delineated for North Wildwood because its shoreline is eroding compared to the accreting adjacent shoreline of Wildwood. Lastly, the control volumes for Long Beach Island and Island Beach were split in order to reduce reach lengths.

TABLE 1: Control Volumes

ID	Control Volume Name	ID	Control Volume Name
1	Cape May Point	15	Absecon Island
2	Cape May Meadows	16	Absecon Inlet
3	Cape May City	17	South Brigantine Island
4	Cape May Inlet	18	Brigantine Inlet
5	Wildwoods	19	North Brigantine Island
6	North Wildwood	20	Little Egg Inlet
7	Hereford Inlet	21	Long Beach Island South
8	Seven Mile Island	22	Long Beach Island North
9	Townsends Inlet	23	Long Beach Island Nodal
10	Ludlam Island	24	Barnegat Inlet
11	Corson Inlet	25	Island Beach South
12	Ocean City	26	Island Beach Central
13	Ocean City Nodal	27	Island Beach North
14	Great Egg Harbor Inlet	28	Manasquan Inlet

Once the control volumes were established, shoreline change was quantified using the 1986 and the 2003 digitized shorelines. The shoreline change analysis involved rotating and translating each digital shoreline to user-defined coordinate system grids. A grid was established for each barrier island/land mass. The digital shorelines were segmented into discrete compartments alongshore on each grid. The compartment boundaries coincided with physical features such as existing groins and bulkheads, etc.... A mean shoreline position was computed within each compartment by integrating the shoreline with respect to the coordinate system over the length of the compartment. A linear “straight-line” fit of the mean shoreline position from compartment to compartment was used to determine an “observed” shoreline change rate. Representative berm heights and closure depths from available profile data was analyzed to determine an active profile height for each control volume. It was assumed that the “observed” shoreline change rate is applicable for the entire active profile height even though the change rate was based upon a digitized mean high water line shoreline. The “observed” shoreline change rate was then converted to a volumetric change rate by multiplying the control volume’s reach length with the active profile height and the computed shoreline change rate.

A “natural” or “background” shoreline change rate that took into account beachfills was then computed. This was done in order to eliminate any “double counting” since beachfill quantities placed and shoreline change rates are considered separate sediment budget inputs for each control volume. Quantities placed from Federal, State, and Local beachfill projects between 1986 and 2003 were previously compiled in a database by the District for the study area. The beachfill quantities were subtracted from the “observed” volumetric change rate previously computed, resulting in a “natural” volumetric change rate. The resultant values were used as control volume inputs for the sediment budget. Lastly, a “natural” shoreline change rate was computed for informational purposes by taking into account the active profile heights used previously. Table 2 summarizes the results of the shoreline change analysis used in the sediment budget.

Another set of inputs that was calculated for the sediment budget was potential longshore transport rates due to waves. These values are to be used as sediment sources/sinks (pathways) connecting control volumes. Wave-driven sediment transport potential was calculated using the CERC energy flux method with the computer program SEDTRAN. Thirteen wave hindcast stations from the updated WIS Wave Hindcast database along the New Jersey coastline were used as inputs to the model. Records were extracted representing peak wave components from 1986 to 2000. It was determined that the wave conditions in this time period would be representative of wave conditions as a whole between the available shorelines of 1986 and 2003. A WIS Phase III transformation was performed on the data using the NEMOS program available through the Coastal and Hydraulics Laboratory (CHL). These transformations were done for representative shoreline angles that were calculated using the 1986 and 2003 shorelines. The wave gage file created from the WIS Phase III transformation was then used as input to determine potential sediment transport rates using the program SEDTRAN.

An analysis of available hydrographic surveys to quantify changes at inlet shoals was conducted for the inlet control volumes of the sediment budget. The computer program SMS was used to contour, compare, and quantify any changes between the surveys for each inlet analyzed. Available hydrographic data that surveyed the entire inlet and not just navigation channels was sparse from 1986 to 2003 for all the inlets. There were no inlets that had hydrographic surveys spanning the entire period of analysis from 1986 to 2003. The volumetric change during the time span where data was available (it varied by inlet) had to be extrapolated to represent the entire period of analysis of 1986 to 2003.

The last set of inputs to go into the sediment budget was the compilation of borrow area and navigation channel dredging records. An average annual dredging rate was computed from the available records. Inlets where navigation channel dredging records were compiled included Manasquan, Barnegat, Absecon, and Cape May Inlets. The records were inspected to see if the dredged material was removed and placed outside the control volume or if the material was "relocated" within the same control volume (i.e. Cape May Inlet). Also, there are several beachfill borrow areas within the control volumes of the sediment budget. The control volumes impacted by borrow area dredging included: Hereford, Townsends, Corson, Great Egg, Absecon, and Brigantine Inlets.

TABLE 2: Shoreline Change Analysis Results

Control Volume	Reach Length (ft)	Average Observed Shoreline Change Rate (ft/yr)	Observed Volumetric Change Rate (cu yd/yr)	Yearly Avg Beachfill Quantities Placed (cu yd/yr)	Natural Volumetric Change Rate (cu yd/yr)	Average Natural Shoreline Change Rate (ft/yr)
Manasquan to Barnegat North	15,743	-3.25	-70,000	0	-70,000	-3.25
Manasquan to Barnegat Central	56,440	-0.97	-75,000	0	-75,000	-0.97
Manasquan to Barnegat South	50,000	-4.16	-285,000	0	-285,000	-4.16
Long Beach Island Nodal	9,271	27.10	344,000	4,000	340,000	26.76
Long Beach Island North	34,527	-3.79	-179,000	53,000	-232,000	-4.90
Long Beach Island South	51,636	-2.61	-185,000	0	-185,000	-2.61
N. Brigantine Island	11,000	-32.50	-450,000	0	-450,000	-32.49
S. Brigantine Island	33,406	2.47	104,000	109,000	-5,000	-0.12
Absecon Island	42,365	-1.37	-71,000	72,000	-143,000	-2.76
Ocean City Nodal	8,730	2.90	30,000	328,000	-298,000	-28.80
Ocean City	31,895	11.51	435,000	285,000	150,000	3.97
Ludlam Island	34,190	-1.16	-47,000	32,000	-79,000	-1.95
Seven Mile Island	33,553	9.09	350,000	305,000	45,000	1.17
North Wildwood	6,840	-31.30	-246,000	11,000	-257,000	-32.72
Wildwood	24,575	8.30	234,000	6,000	228,000	8.08
Cape May City	12,710	10.40	152,000	168,000	-16,000	-1.10
Cape May Meadows	13,730	6.20	95,000	5,000	90,000	5.90
Cape May Point	4,470	-4.70	-23,000	16,000	-39,000	-8.12

SEDIMENT BUDGET UNCERTAINTY

Uncertainty for each sediment budget input variable was considered and tracked using SBAS. Uncertainty provides a means of comparing cells within the budget and quantifying the reliability of the budget as a whole. The percent uncertainty for various inputs can be compared, revealing the degree to which various assumptions are known. A range representing reasonable values for each input was calculated and entered into SBAS. The range was based upon several factors, including: complexity of analysis, data availability, seasonal and yearly fluctuations, experience and CHL guidance. Table 4 summarizes the uncertainty percentages used during the development of the sediment budget

TABLE 3: Sediment Budget Uncertainty

Sediment Budget Input	Uncertainty Percentage
Longshore Sediment Transport	60%
Longshore Sediment Transport to/from Inlets	75%
Beachfill Quantities Placed	20%
Shoreline Erosion/Accretion	40%
Dredging Quantities	20%
Offshore Losses	30%
Inlet Shoal Growth/Reduction	50%

SEDIMENT BUDGET BALANCING

The sediment budget was balanced on a control volume by control volume basis starting with Cape May Point. The sediment budget inputs were adjusted within their computed uncertainty range in order to balance each control volume. Very often control volumes would not balance even when the known inputs were adjusted within their uncertainty ranges. When this happened it was often due to the fact that not all sediment sources/sinks were clearly identified for the control volume being balanced. Once the additional sources/sinks were entered, the control volume was able to be balanced. Inlet control volumes were balanced after balancing the control volumes of the adjacent barrier islands/land masses first. This had to be done in order to minimize the number of unknowns that often existed at the inlets due to lack of data. Common unknowns throughout the sediment budget that had to be solved for once everything else was examined were the transport rates to/from inlets (sand bypassing) to the adjacent barrier islands and land masses. The high uncertainty percentage used for these quantities is a reflection of the fact that there is a lot of variability in these numbers since they are based upon other sediment sources and sinks in the area and the complex hydrodynamics that exists at inlets.

SEDIMENT BUDGET RESULTS

The balanced regional sediment budget is shown graphically on Figures 1-18 and summarized on Tables 4-11. Various assumptions regarding longshore transport, offshore losses, shoal growth/reduction, and shoreline erosion/accretion quantities had to be made in order to solve for unknowns and balance the budget. The following pages describe the assumptions made and the sediment sources and sinks for each control volume.

Cape May Point

The sediment sources are 248,000 cubic yards per year of westerly longshore sediment transport from Cape May Meadows, 63,000 cubic yards per year of easterly longshore sediment transport from the Delaware Bay, 16,000 cubic yards per year of beachfill, and 39,000 cubic yards per year of shoreline erosion. The sediment sinks are 122,000 cubic yards per year of easterly longshore sediment transport to Cape May Meadows, 241,000 cubic yards per year of westerly longshore sediment transport to the Delaware Bay, and an assumed offshore loss of 20% or 3,000 cubic yards per year from the beachfills placed during the period of analysis. Current induced longshore transport from the interaction of the Atlantic Ocean with Delaware Bay was not considered at Cape May Point.

Cape May Meadows

The sediment sources are 388,000 cubic yards per year of westerly longshore sediment transport from Cape May City, 122,000 cubic yards per year of easterly longshore sediment transport from Cape May Point, and 5,000 cubic yards per year of beachfill. The sediment sinks are 176,000 cubic yards per year of easterly longshore sediment transport to Cape May City, 248,000 cubic yards per year of westerly longshore sediment transport to Cape May Point, 90,000 cubic yards per year of shoreline accretion, and an assumed offshore loss of 20% or 1,000 cubic yards per year from the beachfills placed. Current induced longshore transport from the interaction of the Atlantic Ocean with Delaware Bay was not considered at Cape May Point.

Cape May City

The sediment sources are 62,000 cubic yards per year bypassing Cape May Inlet, 176,000 cubic yards per year of easterly longshore sediment transport from Cape May Meadows, 168,000 cubic yards per year of beachfill, and 16,000 cubic yards per year of shoreline erosion. It was assumed that the sediment transport easterly into Cape May Inlet through the western jetty was negligible due to the predominately western direction of sediment transport in the area and stability of the Inlet. The sediment sinks are 388,000 cubic yards per year of westerly longshore transport to Cape May Meadows, and an assumed offshore loss of 20% or 34,000 cubic yards per year from the beachfills placed. The offshore borrow areas used for the Federal Beachfill Project for Cape May do not lie within the boundaries of the control volume and were not considered.

Cape May Inlet

The only sediment source considered was the 62,000 cubic yards per year of material entering the Inlet through the eastern jetty on the Wildwood side of the Inlet. The only sediment sink considered was 62,000 cubic yards per year of material bypassing the Inlet through the western jetty and entering the Cape May City control volume. Dredging of the inlet's navigation channel is done by a sidecasting dredge with no material "removed" from the control volume. The inlet is very stable with a negligible amount of sediment infilling the navigation channel that needs to be relocated using a sidecasting dredge. Easterly sediment transport through the jetties from Cape May City and northerly sediment transport to the Wildwoods was assumed to be negligible. Assumed no sediment transported into the control volume from Cape May Harbor or any offshore losses of sediment beyond the seaward tips of the jetties. Therefore, it was assumed that 100% of the sediment entering the Inlet from Wildwood is bypassed to Cape May City.

Wildwoods

The sediment sources are 530,000 cubic yards per year of southerly longshore sediment transport from North Wildwood, and 6,000 cubic yards per year of beachfill. It was assumed that the sediment source of northerly longshore sediment transport from Cape May Inlet was negligible. The sediment sinks are 122,000 cubic yards per year of northerly longshore sediment transport to North Wildwood, 62,000 cubic yards per year of southerly longshore sediment transport to Cape May Inlet, 45,000 cubic yards per year of shoreline accretion, and an assumed offshore loss of 124,000 cubic yards per year. It was assumed that material from the beachfills placed along with the material moved by southerly longshore sediment transport is accumulating offshore just northeast of Cape May Inlet. It was assumed that the east jetty for Cape May Inlet has effectively "blocked" sediment from entering the Inlet and deflected it offshore to this area which is commonly known as the Coast Guard Base Fillet. No hydrographic survey data was available to confirm this assumption, however profile data collected in 2001 and 2003 confirmed the growth of an offshore bar in the area.

North Wildwood

Since the littoral characteristics of Wildwood differ significantly from North Wildwood (an accreting shoreline for Wildwood versus an eroding shoreline for North Wildwood), a control volume representing just North Wildwood was created. The sediment sources are 320,000 cubic yards per year bypassing Hereford Inlet, 122,000 cubic yards per year of northerly longshore sediment transport from Wildwood, 11,000 cubic yards per year of beachfill, and 257,000 cubic yards per year of shoreline erosion. The sediment sinks are 178,000 cubic yards per year of northerly longshore sediment transport into Hereford Inlet, 530,000 cubic yards per year of southerly longshore sediment transport to Wildwood, and an assumed offshore loss of 20% or 2,000 cubic yards per year from the beachfills placed.

Hereford Inlet

The sediment sources are 450,000 cubic yards per year of southerly longshore sediment transport from Seven Mile Island, 178,000 cubic yards per year of northerly longshore sediment transport from North Wildwood, and 50,000 cubic yards per year of shoreline erosion from Stone Harbor Point which was assumed to be part of this control volume. The sediment sinks are 320,000 cubic yards per year of sand bypassing the Inlet to North Wildwood, 188,000 cubic yards per year of shoal growth which was measured using surveys from 1994 and 2002 with results extrapolated for the entire period of analysis, and 170,000 cubic yards per year of material removed from the Hereford Inlet borrow area. The borrow area for the Seven Mile Island Federal Beachfill Project lies within the control volume and was dredged in early 2003. Northern sediment transport from the Inlet to Seven Mile Island was assumed to be negligible. The Hereford Inlet control volume could not be balanced initially because the shoreline erosion from Stone Harbor Point was not a defined sediment source. Once it was added as a potential sediment source the control volume became easier to balance.

Seven Mile Island (Avalon/Stone Harbor)

The sediment sources are 251,000 cubic yards per year of sediment bypassing Townsends Inlet, and 305,000 cubic yards per year of beachfill placed. The sediment sinks are 450,000 cubic yards per year of southerly longshore sediment transport into Hereford Inlet, 45,000 cubic yards per year of shoreline accretion, and an assumed offshore loss of 20% or 61,000 cubic yards per year from the beachfills placed. The northern sediment transport from Hereford Inlet and the northern sediment transport to Townsends Inlet were assumed to be negligible. These assumptions are consistent with the previous sediment budget developed for this area as part of the Townsends to Cape May Inlet Feasibility Study.

Townsends Inlet

The only sediment source is 445,000 cubic yards per year of southerly longshore sediment transport entering the Inlet from Ludlam Island. The sediment sinks are 251,000 cubic yards per year of sand bypassing to Seven Mile Island, 40,000 cubic yards per year of shoal growth which was measured using surveys from 1998 and 2002 with results adjusted to take into account the short period of record when compared to the 17 year period of analysis for the sediment budget, and 154,000 cubic yards per year of material removed from the Townsends Inlet borrow area. The borrow area for the Seven Mile Island Federal Beachfill Project lies within the control volume and was dredged late in 2002. Northern sediment transport to Ludlam Island and northern sediment transport to the Inlet from Seven Mile Island were assumed to be negligible. These assumptions are consistent with the previous sediment budget developed for this area as part of the Townsends to Cape May Inlet Feasibility Study.

Ludlam Island

The sediment sources are 395,000 cubic yards per year of sand bypassing Corson Inlet, 32,000 cubic yards per year of beachfill, and 79,000 cubic yards per year of shoreline erosion. The sediment sinks are 55,000 cubic yards per year of northerly longshore sediment transport entering Corson Inlet, 445,000 cubic yards per year of southerly longshore sediment transport entering Townsends Inlet, and an assumed offshore loss of 20% or 6,000 cubic yards per year from the beachfills. Northern sediment transport from Townsends Inlet was assumed to be negligible. This assumption is consistent with the previous sediment budget developed for this area as part of the Townsends to Cape May Inlet Feasibility Study.

Corson Inlet

The sediment sources are 347,000 cubic yards per year of southerly longshore sediment transport from Ocean City, 55,000 cubic yards per year of northerly longshore sediment transport from Ludlam Island, and 88,000 cubic yards per year of shoal reduction which was measured using surveys from 1998 and 2001 with results adjusted to take into account the short period of record when compared to the 17 year period of analysis for the sediment budget. The sediment sinks are 42,000 cubic yards per year of sand bypassing to Ocean City, 395,000 cubic yards per year of sand bypassing to Ludlam Island, and 53,000 cubic yards per year of material removed by the State of New Jersey from the Corson Inlet borrow area to replenish the beaches at Strathmere.

Ocean City

The sediment sources are 305,000 cubic yards per year of southerly longshore sediment transport from the Ocean City Nodal control volume, 42,000 cubic yards per year of sand bypassing Corson Inlet, and 285,000 cubic yards per year of beachfill from the Federal Beachfill Project. The sediment sinks are 76,000 cubic yards per year of northerly longshore sediment transport to the Ocean City Nodal control volume, 347,000 cubic yards per year of southerly longshore sediment transport to Corson Inlet, 150,000 cubic yards per year of shoreline accretion, and an assumed offshore loss of 20% or 59,000 cubic yards per year from the beachfills.

Ocean City Nodal

A control volume was delineated in North Ocean City because of the known nodal point where the net sediment transport reverses direction due to the influence of Great Egg Harbor Inlet. The sediment sources are 44,000 cubic yards per year of sand bypassing Great Egg Inlet, 76,000 cubic yards per year of northerly longshore sediment transport from Ocean City, 328,000 cubic yards per year of beachfill, and 298,000 cubic yards per year of shoreline erosion. The sediment sinks are 340,000 cubic yards per year of northerly longshore sediment transport into Great Egg Inlet, 305,000 cubic yards per year of southerly longshore sediment transport into Ocean City, and an assumed offshore loss of 30% or 101,000 cubic yards per year from the beachfills. The offshore loss percentage was increased from 20% because of the persistently higher than average loss of beachfill material in the area when compared to other beachfill projects on the coastline.

Great Egg Inlet

The sediment sources are 241,000 cubic yards per year of southerly longshore sediment transport from Absecon Island, 340,000 cubic yards of northerly longshore sediment transport from North Ocean City, and 180,000 cubic yards per year of shoal growth which was measured using surveys from 1996, 2000 and 2002 with results extrapolated for the entire 17 year period of analysis. The sediment sinks are 44,000 cubic yards per year of sand bypassing to North Ocean City, 87,000 cubic yards per year of shoreline accretion at the Ocean City inlet frontage (commonly known as “The Gardens), and 630,000 cubic yards per year removed from the Ocean City borrow area. Northern sediment transport to Absecon Island was assumed to be negligible given the existence of the jetty at Longport and the configuration of the Inlet and Absecon Island. This assumption is consistent with the previous sediment budget developed for this area.

Absecon Island

The sediment sources are 180,000 cubic yards per year of sand bypassing Absecon Inlet, 72,000 cubic yards per year of beachfill, and 143,000 cubic yards per year of shoreline erosion. The sediment sinks are 140,000 cubic yards per year of northerly longshore sediment transport to Absecon Inlet, 241,000 cubic yards per year of southerly longshore sediment transport to Great Egg Inlet, and an assumed offshore loss of 20% or 14,000 cubic yards per year from the beachfills. The Federal Beachfill Project did not start placing sand until December 2003 and was not incorporated into the sediment budget. Northern sediment transport from Great Egg Inlet was assumed to be negligible.

Absecon Inlet

The sediment sources are 310,000 cubic yards per year of southerly longshore sediment transport from S. Brigantine Island, and 140,000 cubic yards per year of northerly longshore sediment transport from Absecon Island. The sediment sinks are 50,000 cubic yards per year of sand bypassing to S. Brigantine Island, 180,000 cubic yards per year of sand bypassing to Absecon Island, 30,000 cubic yards per year of shoreline accretion at the Brigantine Island frontage which was assumed to be part of this control volume, 133,000 cubic yards per year of shoal reduction which was solved for iteratively since hydrographic survey data covering the entire inlet and not just the navigation channel was very minimal, and 57,000 cubic yards per year of inlet dredging. This control volume could not be balanced until the shoreline accretion at Brigantine Island frontage was considered.

South Brigantine Island

The sediment sources are 283,000 cubic yards per year of sand bypassing Brigantine Inlet, 50,000 cubic yards per year of sand bypassing Absecon Inlet, 109,000 cubic yards per year of beachfill, and 5,000 cubic yards per year of shoreline erosion. The sediment sinks are 115,000 cubic yards per year of northerly sediment transport to Brigantine Inlet, 310,000 cubic yards per year of southerly longshore sediment transport to Absecon Inlet, and an assumed offshore loss of 20% or 22,000 cubic yards per year from the beachfills.

Brigantine Inlet

The sediment sources are 470,000 cubic yards per year of southerly longshore sediment transport from N. Brigantine Island, and 115,000 cubic yards per year of northerly longshore sediment transport from S. Brigantine Island. The sediment sinks are 75,000 cubic yards per year of sand bypassing to N. Brigantine Island, 283,000 cubic yards per year of sand bypassing to S. Brigantine Island, 28,000 cubic yards per year of shoreline accretion at the South Brigantine Island frontage which was assumed to be part of this control volume, 67,000 cubic yards per year of shoal growth which had to be solved for iteratively since hydrographic survey data covering the entire inlet was very minimal, and 132,000 cubic yards per year of material removed from the Brigantine borrow area. The borrow area in the inlet was assumed to be dredged for the 1996 and 2001 State/Local beachfills for Brigantine City.

North Brigantine Island

The sediment sources are 240,000 cubic yards per year of sand bypassing Little Egg Inlet, 75,000 cubic yards per year of sand bypassing Brigantine Inlet, and 450,000 cubic yards per year of shoreline erosion. The sediment sinks are 295,000 cubic yards per year of northerly longshore sediment transport to Little Egg Inlet, and 470,000 cubic yards per year of southerly longshore sediment transport to Brigantine Inlet. There were no beachfills recorded for the island.

Little Egg Inlet

The sediment sources are 360,000 cubic yards per year of southerly longshore sediment transport from Long Beach Island, and 295,000 cubic yards per year of northerly longshore sediment transport from N. Brigantine Island. The sediment sinks are 95,000 cubic yards per year of sand bypassing to Long Beach Island, 240,000 cubic yards per year of sand bypassing to N. Brigantine Island, 83,000 cubic yards per year of shoreline accretion at the southern tip of Long Beach Island which was assumed to be part of this control volume, and 237,000 cubic yards per year of shoal growth which had to be solved for iteratively in order to balance the control volume since hydrographic survey data covering the entire inlet did not exist.

Long Beach Island South

Long Beach Island was divided into three control volumes in order to reduce reach lengths used in the analysis. Long Beach Island South extends from Little Egg Inlet to the town of Surf City. The sediment sources are 295,000 cubic yards per year of southerly longshore sediment transport from the Long Beach Island Central control volume, 95,000 cubic yards per year of sand bypassing Little Egg Inlet, and 185,000 cubic yards per year of shoreline erosion. There were no reported beachfills from 1986 to 2003 for this control volume.

Long Beach Island North

This control volume extends from Surf City in the south to Loveladies in the north. The sediment sources are 105,000 cubic yards per year of southerly longshore sediment transport from the Long Beach Island Nodal control volume, 205,000 cubic yards per year of northerly longshore sediment transport from the Long Beach Island South control volume, and 53,000 cubic yards per year of beachfill. The sediment sinks are 295,000 cubic yards per year of northerly longshore sediment transport to the Long Beach Island control volume, 285,000 cubic yards per year of southerly longshore sediment transport to the Long Beach Island South control volume, and an assumed offshore loss of 20% or 15,000 cubic yards per year from the beachfills.

Long Beach Island Nodal

There is a nodal point in Northern part of Long Beach Island at Barnegat Light where the net sediment transport reverses direction due to the shadowing effects of Long Island. North of this point, net sediment transport for the coast of New Jersey is to the north and south of this point, net sediment transport is to the south. The calculation of the longshore sediment transport using the updated WIS wave hindcast verified this commonly known belief. There are local reversals North and South of this point along the coastline where the transport direction changes. The local reversals can be attributable to inlet influences (i.e. North Ocean City and Great Egg Inlet). A control volume was delineated for this nodal zone. The sediment sources are 390,000 cubic yards per year of sand bypassing Barnegat Inlet, 295,000 cubic yards per year of northerly longshore sediment transport from the Long Beach Island North control volume and 4,000 cubic yards per year of beachfill. The sediment sinks are 243,000 cubic yards per year of northerly longshore sediment transport into Barnegat Inlet, 105,000 cubic yards per year of southerly longshore sediment transport to the Long Beach Island North control volume, 340,000 cubic yards of shoreline accretion, and an assumed offshore loss of 20% or 1,000 cubic yards per year from the beachfills.

Barnegat Inlet

The sediment sources are 740,000 cubic yards per year of southerly longshore sediment transport from Island Beach State Park, 243,000 cubic yards per year of northerly longshore sediment transport from Barnegat Light, and 137,000 cubic yards per year of shoal reduction. Hydrographic surveys showed that there was a reduction in shoal material. This reduction was measured using surveys from 1997 and 2000 with results extrapolated for the entire 17 year period of analysis. Other survey data prior to 1997 was available and used for reference purposes but the data did not provide complete coverage of the shoal. The sediment sinks are 470,000 cubic yards per year of sand bypassing to Island Beach State Park, 390,000 cubic yards per year of sand bypassing to Barnegat Light, and 260,000 cubic yards per year of Inlet dredging as part of the navigation project in the Inlet.

Island Beach South

Manasquan Inlet to Barnegat Inlet (commonly called Island Beach) was segmented into three control volumes in order to reduce reach lengths for analysis purposes. Island Beach South extends from Barnegat Inlet in the south to South Seaside Park in the north and encompasses Island Beach State Park. The sediment sources are 985,000 cubic yards per year of southerly longshore sediment transport from the Island Beach Central control volume, 470,000 cubic yards per year of sand bypassing Barnegat Inlet, and 285,000 cubic yards per year of shoreline erosion. The sediment sinks are 1,000,000 cubic yards per year of northerly longshore sediment transport to the Island Beach Central control volume, and 740,000 cubic yards per year of southerly longshore sediment transport into Barnegat Inlet. No beachfills were recorded for this control volume during the 1986-2003 period of analysis. Longshore sediment transport magnitudes are noticeably higher between Manasquan and Barnegat Inlets than anywhere else due to influence from Barnegat Inlet which is both a large sediment source and sink in the region, and the change in wave climate due to the shadowing effects of Long Island, New York.

Island Beach Central

This control volume extends from South Seaside Park in the south to the town of Mantoloking in the north. The sediment sources are 965,000 cubic yards per year of southerly longshore sediment transport from the Island Beach North control volume, 75,000 cubic yards per year of shoreline erosion, and 1,000,000 cubic yards per year of northerly longshore sediment transport from the Island Beach South control volume. The sediment sinks are 1,055,000 cubic yards per year of northerly longshore sediment transport to the Island Beach North control volume, and 985,000 cubic yards per year of southerly longshore sediment transport to the Island Beach South control volume. There were no reported significant beachfills for the towns within this control volume during the time period of 1986 to 2003.

Island Beach North

This control volume includes the towns of Bay Head and Point Pleasant. The sediment sources are 825,000 cubic yards per year of sand bypassing Manasquan Inlet, 1,055,000 cubic yards per year of northerly longshore sediment transport from the Island Beach Central control volume, and 70,000 cubic yards per year of shoreline erosion. The sediment sinks are 985,000 cubic yards per year of northerly longshore sediment transport into Manasquan Inlet, and 965,000 cubic yards per year of southerly longshore sediment transport to the Island Beach Central control volume. There were no reported significant beachfills during the time period of 1986 to 2003.

Manasquan Inlet

Manasquan Inlet is a relatively stable inlet. The northerly and southerly transport to and from Monmouth County was provided by New York District. The sediment sources are 985,000 cubic yards per year of northerly longshore sediment transport from Point Pleasant, and 859,000 cubic yards per year of southerly longshore transport from Monmouth County. The sediment sinks are 825,000 cubic yards per year of sand bypassing to Point Pleasant, 994,000 cubic yards per year of northerly transport to Monmouth County, and 25,000 cubic yards per year of dredging of the navigation channel.

TABLE 4: Sediment Budget Results for Cape May

Control Volume	Flux Value (cu yd/yr)	Source or Sink	To	From	Description
Cape May Point	63,000	Source	Cape May Point	N/A	Longshore Sediment Transport
	241,000	Sink	N/A	Cape May Point	Longshore Sediment Transport
	39,000	Source	Cape May Point	N/A	Shoreline Erosion
	16,000	Source	Cape May Point	N/A	Beachfill
	3,000	Sink	N/A	Cape May Point	Offshore Beachfill Losses
	122,000	Sink	Cape May Meadows	Cape May Point	Longshore Sediment Transport
	248,000	Source	Cape May Point	Cape May Meadows	Longshore Sediment Transport
Cape May Meadows	122,000	Source	Cape May Meadows	Cape May Point	Longshore Sediment Transport
	248,000	Sink	Cape May Point	Cape May Meadows	Longshore Sediment Transport
	90,000	Sink	N/A	Cape May Meadows	Shoreline Accretion
	5,000	Source	Cape May Meadows	N/A	Beachfill
	1,000	Sink	N/A	Cape May Meadows	Offshore Beachfill Losses
	176,000	Sink	Cape May City	Cape May Meadows	Longshore Sediment Transport
	388,000	Source	Cape May Meadows	Cape May City	Longshore Sediment Transport
Cape May City	176,000	Source	Cape May City	Cape May Meadows	Longshore Sediment Transport
	388,000	Sink	Cape May Meadows	Cape May City	Longshore Sediment Transport
	16,000	Source	Cape May City	N/A	Shoreline Erosion
	168,000	Source	Cape May City	N/A	Beachfill
	34,000	Sink	N/A	Cape May City	Offshore Beachfill Losses
	0	Sink	Cape May Inlet	Cape May City	Longshore Sediment Transport
	62,000	Source	Cape May City	Cape May Inlet	Longshore Sediment Transport
Cape May Inlet	0	Source	Cape May Inlet	Cape May City	Longshore Sediment Transport
	62,000	Sink	Cape May City	Cape May Inlet	Longshore Sediment Transport
	0	Sink	Wildwoods	Cape May Inlet	Longshore Sediment Transport
	62,000	Source	Cape May Inlet	Wildwoods	Longshore Sediment Transport

TABLE 5: Sediment Budget Results for the Wildwods

Control Volume	Flux Value (cu yd/yr)	Source or Sink	To	From	Description
Wildwoods	0	Source	Wildwoods	Cape May Inlet	Longshore Sediment Transport
	62,000	Sink	Cape May Inlet	Wildwoods	Longshore Sediment Transport
	228,000	Sink	N/A	Wildwoods	Shoreline Accretion
	123,000	Sink	N/A	Wildwoods	Offshore Losses
	6,000	Source	Wildwoods	N/A	Beachfill
	1,000	Sink	N/A	Wildwoods	Offshore Beachfill Losses
	122,000	Sink	North Wildwood	Wildwoods	Longshore Sediment Transport
	530,000	Source	Wildwoods	North Wildwood	Longshore Sediment Transport
North Wildwood	122,000	Source	North Wildwood	Wildwoods	Longshore Sediment Transport
	530,000	Sink	Wildwoods	North Wildwood	Longshore Sediment Transport
	257,000	Source	North Wildwood	N/A	Shoreline Erosion
	11,000	Source	North Wildwood	N/A	Beachfill
	2,000	Sink	N/A	North Wildwood	Offshore Beachfill Losses
	178,000	Sink	Hereford Inlet	North Wildwood	Longshore Sediment Transport
	320,000	Source	North Wildwood	Hereford Inlet	Longshore Sediment Transport
Hereford Inlet	178,000	Source	Hereford Inlet	North Wildwood	Longshore Sediment Transport
	320,000	Sink	North Wildwood	Hereford Inlet	Longshore Sediment Transport
	50,000	Source	Hereford Inlet	N/A	Shoreline Erosion
	188,000	Sink	N/A	Hereford Inlet	Shoal Growth
	170,000	Sink	N/A	Hereford Inlet	Borrow Area Dredging
	0	Sink	Seven Mile Beach	Hereford Inlet	Longshore Sediment Transport
	450,000	Source	Hereford Inlet	Seven Mile Beach	Longshore Sediment Transport

TABLE 6: Sediment Budget Results for Seven Mile and Ludlam Islands

Control Volume	Flux Value (cu yd/yr)	Source or Sink	To	From	Description
Seven Mile Beach	0	Source	Seven Mile Beach	Hereford Inlet	Longshore Sediment Transport
	450,000	Sink	Hereford Inlet	Seven Mile Beach	Longshore Sediment Transport
	45,000	Sink	N/A	Seven Mile Beach	Shoreline Accretion
	305,000	Source	Seven Mile Beach	N/A	Beachfill
	61,000	Sink	N/A	Seven Mile Beach	Offshore Beachfill Losses
	0	Sink	Townsends Inlet	Seven Mile Beach	Longshore Sediment Transport
	251,000	Source	Seven Mile Beach	Townsends Inlet	Longshore Sediment Transport
Townsends Inlet	0	Source	Townsends Inlet	Seven Mile Beach	Longshore Sediment Transport
	251,000	Sink	Seven Mile Beach	Townsends Inlet	Longshore Sediment Transport
	40,000	Sink	N/A	Townsends Inlet	Shoal Growth
	154,000	Sink	N/A	Townsends Inlet	Borrow Area Dredging
	0	Sink	Ludlam Island	Townsends Inlet	Longshore Sediment Transport
	445,000	Source	Townsends Inlet	Ludlam Island	Longshore Sediment Transport
Ludlam Island	0	Source	Ludlam Island	Townsends Inlet	Longshore Sediment Transport
	445,000	Sink	Townsends Inlet	Ludlam Island	Longshore Sediment Transport
	79,000	Source	Ludlam Island	N/A	Shoreline Erosion
	32,000	Source	Ludlam Island	N/A	Beachfill
	6,000	Sink	N/A	Ludlam Island	Offshore Beachfill Losses
	55,000	Sink	Corson Inlet	Ludlam Island	Longshore Sediment Transport
	395,000	Source	Ludlam Island	Corson Inlet	Longshore Sediment Transport
Corson Inlet	55,000	Source	Corson Inlet	Ludlam Island	Longshore Sediment Transport
	395,000	Sink	Ludlam Island	Corson Inlet	Longshore Sediment Transport
	88,000	Source	Corson Inlet	N/A	Shoal Reduction
	53,000	Sink	N/A	Corson Inlet	Borrow Area Dredging
	42,000	Sink	Ocean City	Corson Inlet	Longshore Sediment Transport
	347,000	Source	Corson Inlet	Ocean City	Longshore Sediment Transport

TABLE 7: Sediment Budget Results for Ocean City

Control Volume	Flux Value (cu yd/yr)	Source or Sink	To	From	Description
Ocean City	42,000	Source	Ocean City	Corson Inlet	Longshore Sediment Transport
	347,000	Sink	Corson Inlet	Ocean City	Longshore Sediment Transport
	150,000	Sink	N/A	Ocean City	Shoreline Accretion
	285,000	Source	Ocean City	N/A	Beachfill
	59,000	Sink	N/A	Ocean City	Offshore Beachfill Losses
	76,000	Sink	Ocean City Nodal	Ocean City	Longshore Sediment Transport
	305,000	Source	Ocean City	Ocean City Nodal	Longshore Sediment Transport
Ocean City Nodal	76,000	Source	Ocean City Nodal	Ocean City	Longshore Sediment Transport
	305,000	Sink	Ocean City	Ocean City Nodal	Longshore Sediment Transport
	298,000	Source	Ocean City Nodal	N/A	Shoreline Erosion
	328,000	Source	Ocean City Nodal	N/A	Beachfill
	101,000	Sink	N/A	Ocean City Nodal	Offshore Beachfill Losses
	340,000	Sink	Great Egg Inlet	Ocean City Nodal	Longshore Sediment Transport
	44,000	Source	Ocean City Nodal	Great Egg Inlet	Longshore Sediment Transport
Great Egg Inlet	340,000	Source	Great Egg Inlet	Ocean City Nodal	Longshore Sediment Transport
	44,000	Sink	Ocean City Nodal	Great Egg Inlet	Longshore Sediment Transport
	87,000	Sink	N/A	Great Egg Inlet	Shoreline Accretion
	180,000	Source	Great Egg Inlet	N/A	Shoal Growth
	630,000	Sink	N/A	Great Egg Inlet	Borrow Area Dredging
	0	Sink	Absecon Island	Great Egg Inlet	Longshore Sediment Transport
	241,000	Source	Great Egg Inlet	Absecon Island	Longshore Sediment Transport

TABLE 8: Sediment Budget Results for Absecon & S. Brigantine Islands

Control Volume	Flux Value (cu yd/yr)	Source or Sink	To	From	Description
Absecon Island	0	Source	Absecon Island	Great Egg Inlet	Longshore Sediment Transport
	241,000	Sink	Great Egg Inlet	Absecon Island	Longshore Sediment Transport
	143,000	Source	Absecon Island	N/A	Shoreline Erosion
	72,000	Source	Absecon Island	N/A	Beachfill
	14,000	Sink	N/A	Absecon Island	Offshore Beachfill Losses
	140,000	Sink	Absecon Inlet	Absecon Island	Longshore Sediment Transport
	180,000	Source	Absecon Island	Absecon Inlet	Longshore Sediment Transport
Absecon Inlet	140,000	Source	Absecon Inlet	Absecon Island	Longshore Sediment Transport
	180,000	Sink	Absecon Island	Absecon Inlet	Longshore Sediment Transport
	133,000	Sink	N/A	Absecon Inlet	Shoal Reduction
	30,000	Sink	N/A	Absecon Inlet	Shoreline Accretion
	57,000	Sink	N/A	Absecon Inlet	Borrow Area Dredging
	50,000	Sink	S. Brigantine Island	Absecon Inlet	Longshore Sediment Transport
	310,000	Source	Absecon Inlet	S. Brigantine Island	Longshore Sediment Transport
South Brigantine Island	50,000	Source	S. Brigantine Island	Absecon Inlet	Longshore Sediment Transport
	310,000	Sink	Absecon Inlet	S. Brigantine Island	Longshore Sediment Transport
	5,000	Source	S. Brigantine Island	N/A	Shoreline Erosion
	109,000	Source	S. Brigantine Island	N/A	Beachfill
	22,000	Sink	N/A	S. Brigantine Island	Offshore Beachfill Losses
	115,000	Sink	Brigantine Inlet	S. Brigantine Island	Longshore Sediment Transport
	283,000	Source	S. Brigantine Island	Brigantine Inlet	Longshore Sediment Transport
Brigantine Inlet	115,000	Source	Brigantine Inlet	S. Brigantine Island	Longshore Sediment Transport
	283,000	Sink	S. Brigantine Island	Brigantine Inlet	Longshore Sediment Transport
	67,000	Sink	N/A	Brigantine Inlet	Shoal Growth
	28,000	Sink	N/A	Brigantine Inlet	Shoreline Accretion
	132,000	Sink	N/A	Brigantine Inlet	Borrow Area Dredging
	75,000	Sink	N. Brigantine Island	Brigantine Inlet	Longshore Sediment Transport
	470,000	Source	Brigantine Inlet	N. Brigantine Island	Longshore Sediment Transport

TABLE 9: Sediment Budget Results for N. Brigantine Island & LBI

Control Volume	Flux Value (cu yd/yr)	Source or Sink	To	From	Description
North Brigantine Island	75,000	Source	N. Brigantine Island	Brigantine Inlet	Longshore Sediment Transport
	470,000	Sink	Brigantine Inlet	N. Brigantine Island	Longshore Sediment Transport
	450,000	Source	N. Brigantine Island	N/A	Shoreline Erosion
	295,000	Sink	Little Egg Inlet	N. Brigantine Island	Longshore Sediment Transport
	240,000	Source	N. Brigantine Island	Little Egg Inlet	Longshore Sediment Transport
Little Egg Inlet	295,000	Source	Little Egg Inlet	N. Brigantine Island	Longshore Sediment Transport
	240,000	Sink	N. Brigantine Island	Little Egg Inlet	Longshore Sediment Transport
	237,000	Sink	N/A	Little Egg Inlet	Shoal Growth
	83,000	Sink	N/A	Little Egg Inlet	Shoreline Accretion
	95,000	Sink	Long Beach Island South	Little Egg Inlet	Longshore Sediment Transport
	360,000	Source	Little Egg Inlet	Long Beach Island South	Longshore Sediment Transport
LBI South	95,000	Source	Long Beach Island South	Little Egg Inlet	Longshore Sediment Transport
	360,000	Sink	Little Egg Inlet	Long Beach Island South	Longshore Sediment Transport
	185,000	Source	Long Beach Island South	N/A	Shoreline Erosion
	205,000	Sink	Long Beach Island North	Long Beach Island South	Longshore Sediment Transport
	285,000	Source	Long Beach Island South	Long Beach Island North	Longshore Sediment Transport
LBI North	205,000	Source	Long Beach Island North	Long Beach Island South	Longshore Sediment Transport
	285,000	Sink	Long Beach Island South	Long Beach Island North	Longshore Sediment Transport
	232,000	Source	Long Beach Island North	N/A	Shoreline Erosion
	53,000	Source	Long Beach Island North	N/A	Beachfill
	15,000	Sink	N/A	Long Beach Island North	Offshore Beachfill Losses
	295,000	Sink	LBI Nodal	Long Beach Island North	Longshore Sediment Transport
	105,000	Source	Long Beach Island North	LBI Nodal	Longshore Sediment Transport

TABLE 10: Sediment Budget Results for Barnegat Inlet & Vicinity

Control Volume	Flux Value (cu yd/yr)	Source or Sink	To	From	Description
LBI Nodal	295,000	Source	LBI Nodal	Long Beach Island North	Longshore Sediment Transport
	105,000	Sink	Long Beach Island North	LBI Nodal	Longshore Sediment Transport
	340,000	Sink	N/A	LBI Nodal	Shoreline Accretion
	4,000	Source	LBI Nodal	N/A	Beachfill
	1,000	Sink	N/A	LBI Nodal	Offshore Beachfill Losses
	243,000	Sink	Barnegat Inlet	LBI Nodal	Longshore Sediment Transport
	390,000	Source	LBI Nodal	Barnegat Inlet	Longshore Sediment Transport
Barnegat Inlet	243,000	Source	Barnegat Inlet	LBI Nodal	Longshore Sediment Transport
	390,000	Sink	LBI Nodal	Barnegat Inlet	Longshore Sediment Transport
	260,000	Sink	N/A	Barnegat Inlet	Navigation Dredging
	137,000	Source	Barnegat Inlet	N/A	Shoal Reduction
	470,000	Sink	Island Beach South	Barnegat Inlet	Longshore Sediment Transport
	740,000	Source	Barnegat Inlet	Island Beach South	Longshore Sediment Transport
Island Beach South	470,000	Source	Island Beach South	Barnegat Inlet	Longshore Sediment Transport
	740,000	Sink	Barnegat Inlet	Island Beach South	Longshore Sediment Transport
	285,000	Source	Island Beach South	N/A	Shoreline Erosion
	1,000,000	Sink	Island Beach Central	Island Beach South	Longshore Sediment Transport
	985,000	Source	Island Beach South	Island Beach Central	Longshore Sediment Transport

TABLE 11: Sediment Budget Results for Island Beach & Manasquan

Control Volume	Flux Value (cu yd/yr)	Source or Sink	To	From	Description
Island Beach Central	1,000,000	Source	Island Beach Central	Island Beach South	Longshore Sediment Transport
	985,000	Sink	Island Beach South	Island Beach Central	Longshore Sediment Transport
	75,000	Source	Island Beach Central	N/A	Shoreline Erosion
	1,055,000	Sink	Island Beach North	Island Beach Central	Longshore Sediment Transport
	965,000	Source	Island Beach Central	Island Beach North	Longshore Sediment Transport
Island Beach North	1,055,000	Source	Island Beach North	Island Beach Central	Longshore Sediment Transport
	965,000	Sink	Island Beach Central	Island Beach North	Longshore Sediment Transport
	70,000	Source	Island Beach North	N/A	Shoreline Erosion
	985,000	Sink	Manasquan Inlet	Island Beach North	Longshore Sediment Transport
	825,000	Source	Island Beach North	Manasquan Inlet	Longshore Sediment Transport
Manasquan Inlet	985,000	Source	Manasquan Inlet	Island Beach North	Longshore Sediment Transport
	825,000	Sink	Island Beach North	Manasquan Inlet	Longshore Sediment Transport
	25,000	Sink	N/A	Manasquan Inlet	Navigation Dredging
	859,000	Source	Manasquan Inlet	Monmouth County	Longshore Sediment Transport
	994,000	Sink	Monmouth County	Manasquan Inlet	Longshore Sediment Transport

Figure 1. Sediment Budget for Cape May and Vicinity (1000x yds^3 / yr)

Figure 2. Sediment Budget for Wildwoods and Vicinity (1000x yds^3 / yr)

Figure 3. Sediment Budget for Hereford Inlet and Vicinity (1000x yds^3 / yr)

Figure 4. Sediment Budget for Townsends Inlet and Vicinity (1000x yds^3 / yr)

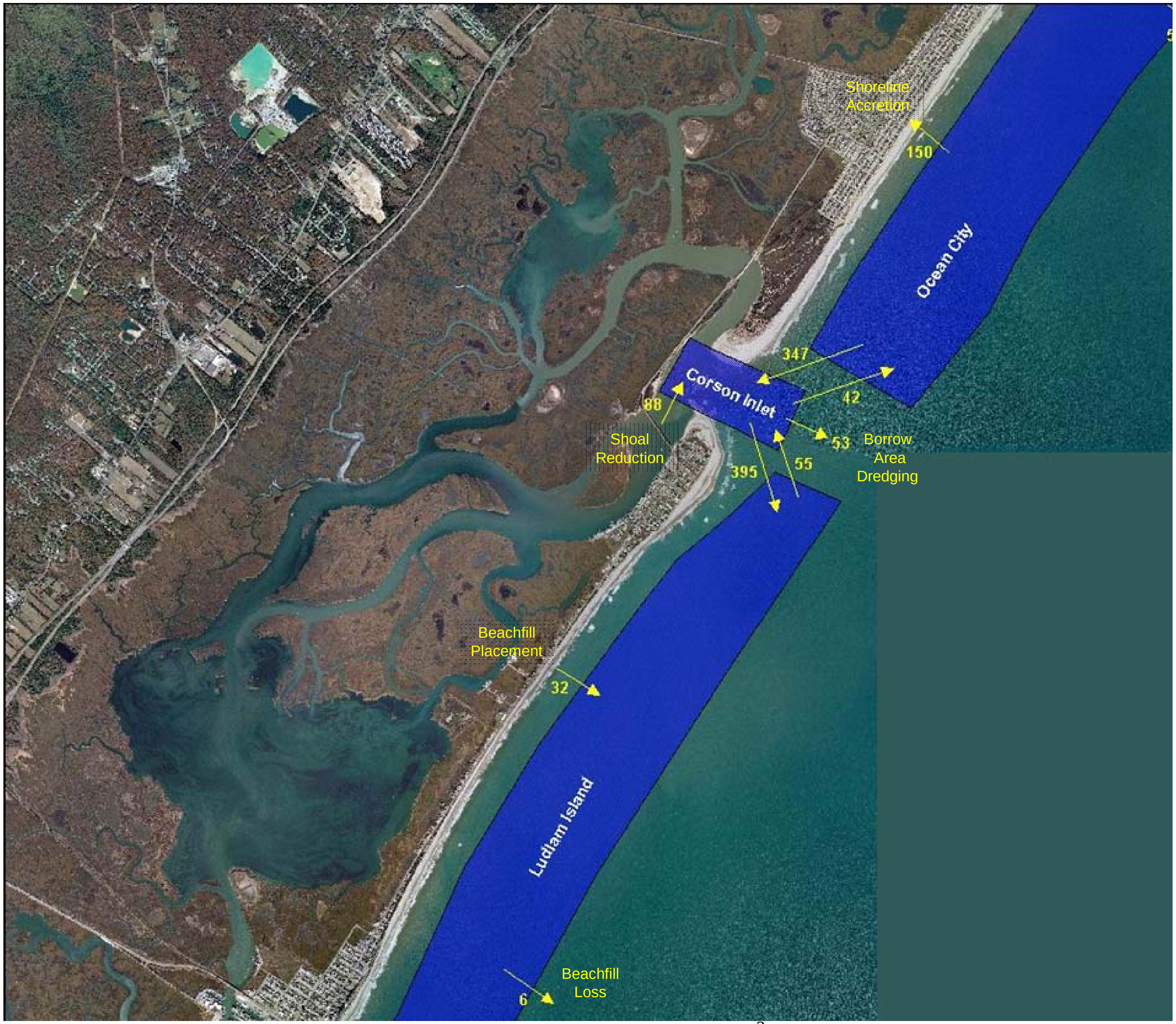

Figure 5. Sediment Budget for Corson Inlet and Vicinity (1000x yds^3 / yr)

Figure 6. Sediment Budget for Ocean City and Vicinity (1000x yds^3 / yr)

Figure 7. Sediment Budget for Absecon Island and Vicinity (1000x yds^3 / yr)

Figure 8. Sediment Budget for Absecon Inlet and Vicinity (1000x yds^3 / yr)

Figure 9. Sediment Budget for Brigantine Inlet and Vicinity (1000x yds^3 / yr)

Figure 10. Sediment Budget for Little Egg Inlet and Vicinity (1000x yds^3 / yr)

Figure 11. Sediment Budget for South Long Beach Island (1000x yds^3 / yr)

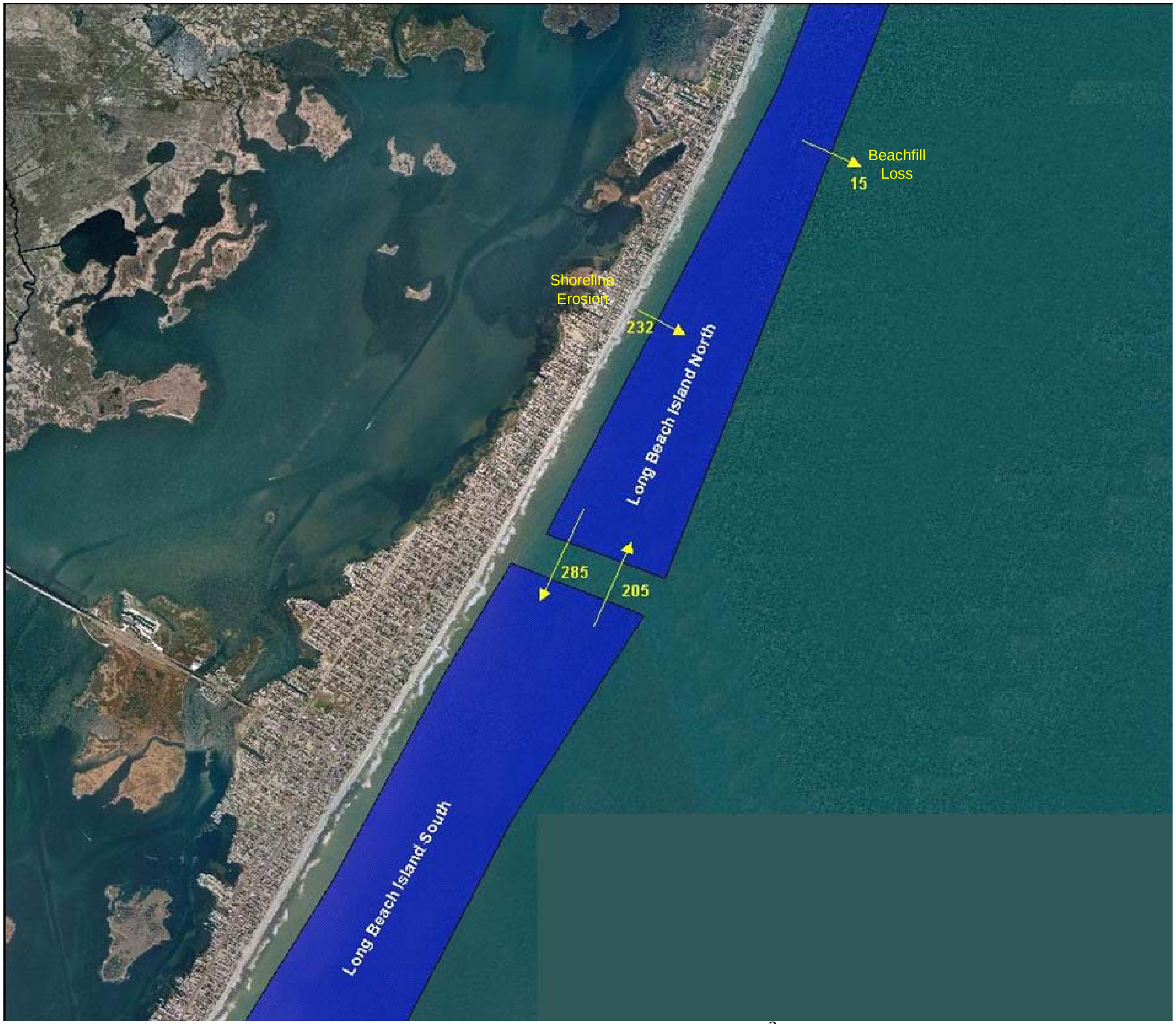

Figure 12. Sediment Budget for North Long Beach Island (1000x yds^3 / yr)

Figure 13. Sediment Budget for Barnegat Inlet and Vicinity (1000x yds^3 / yr)

Figure 14. Sediment Budget for Island Beach State Park (1000x yds^3 / yr)

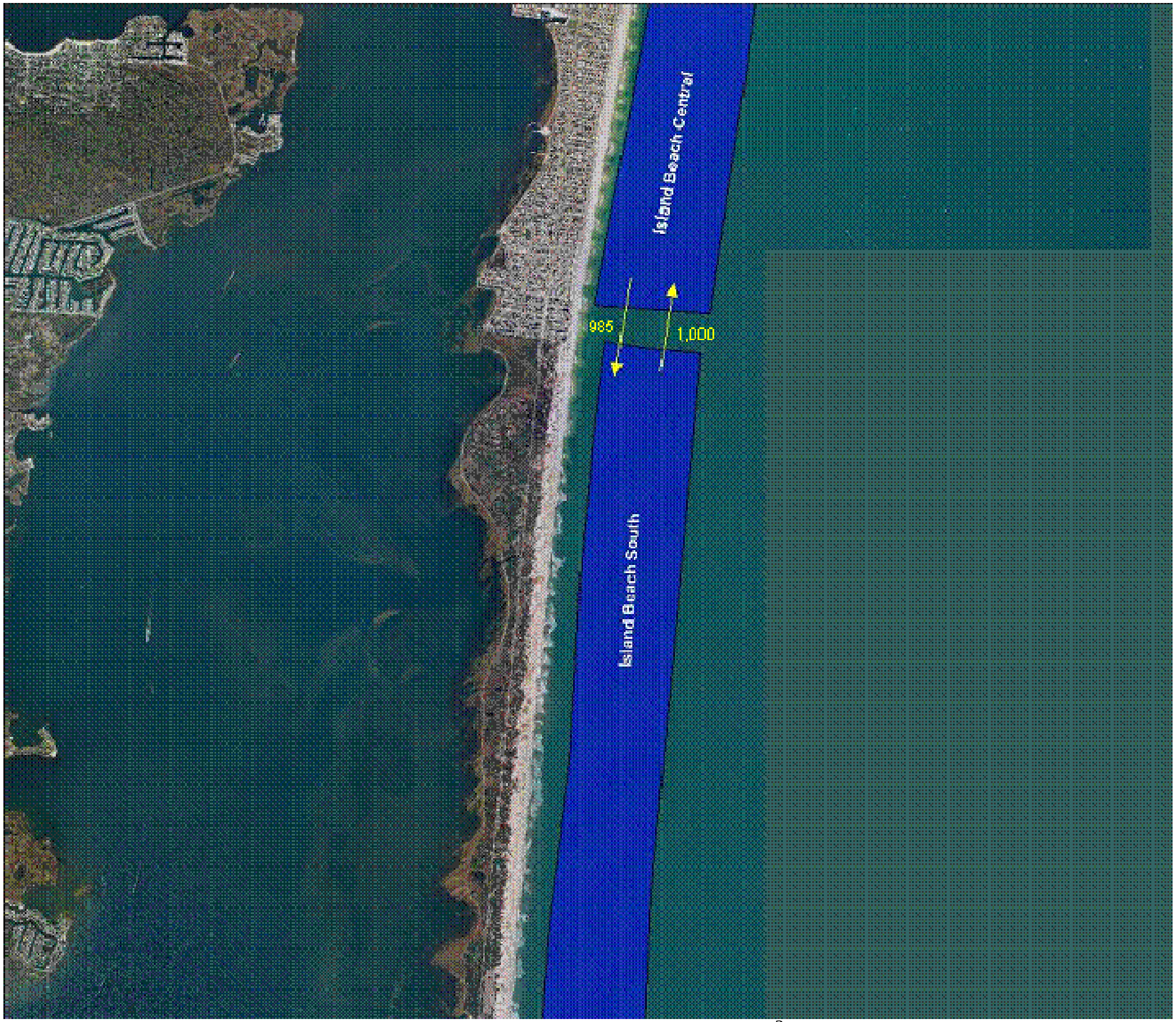

Figure 15. Sediment Budget for Seaside Park and Vicinity (1000x yds^3 / yr)

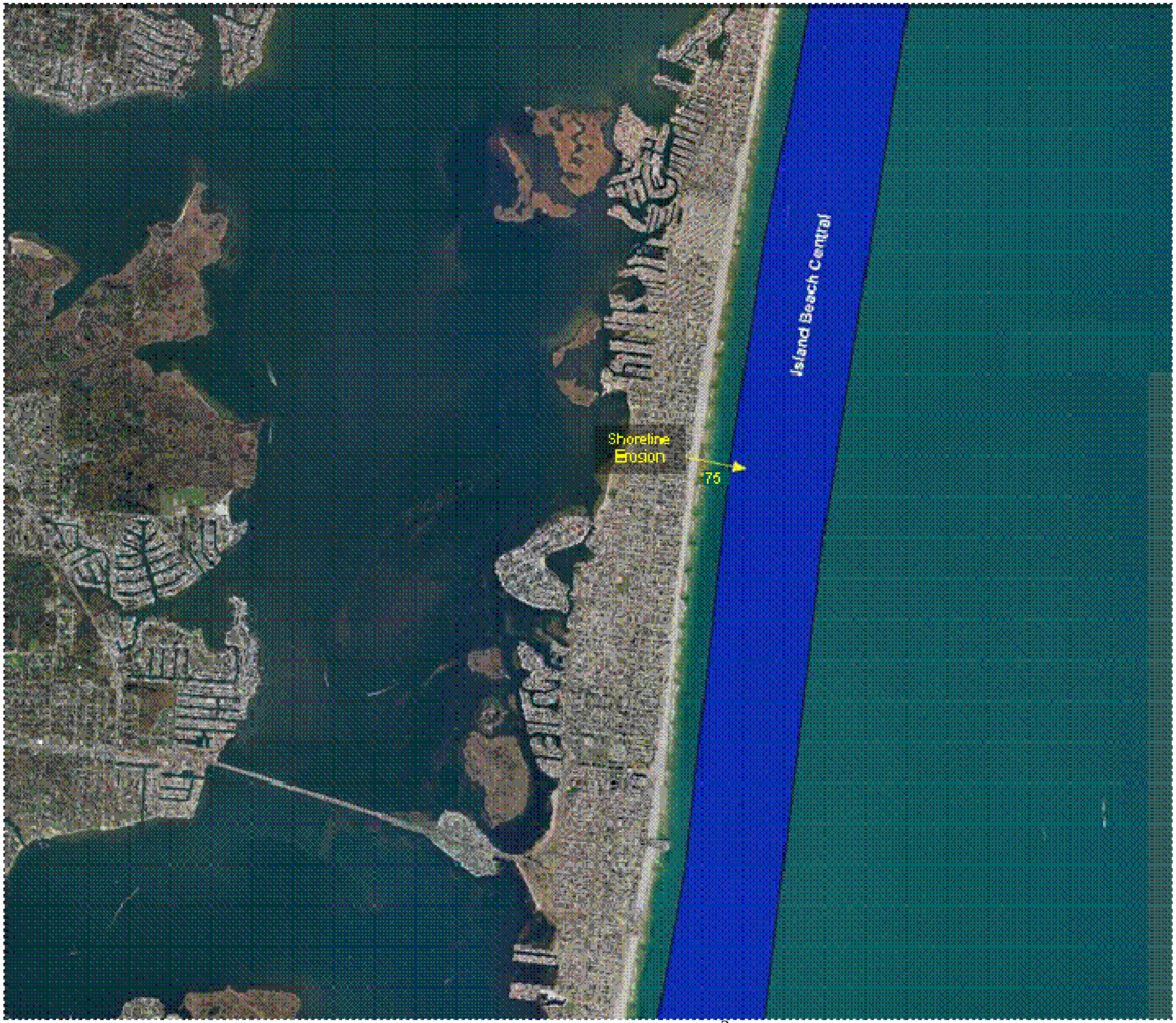

Figure 16. Sediment Budget for Central Island Beach (1000x yds^3 / yr)

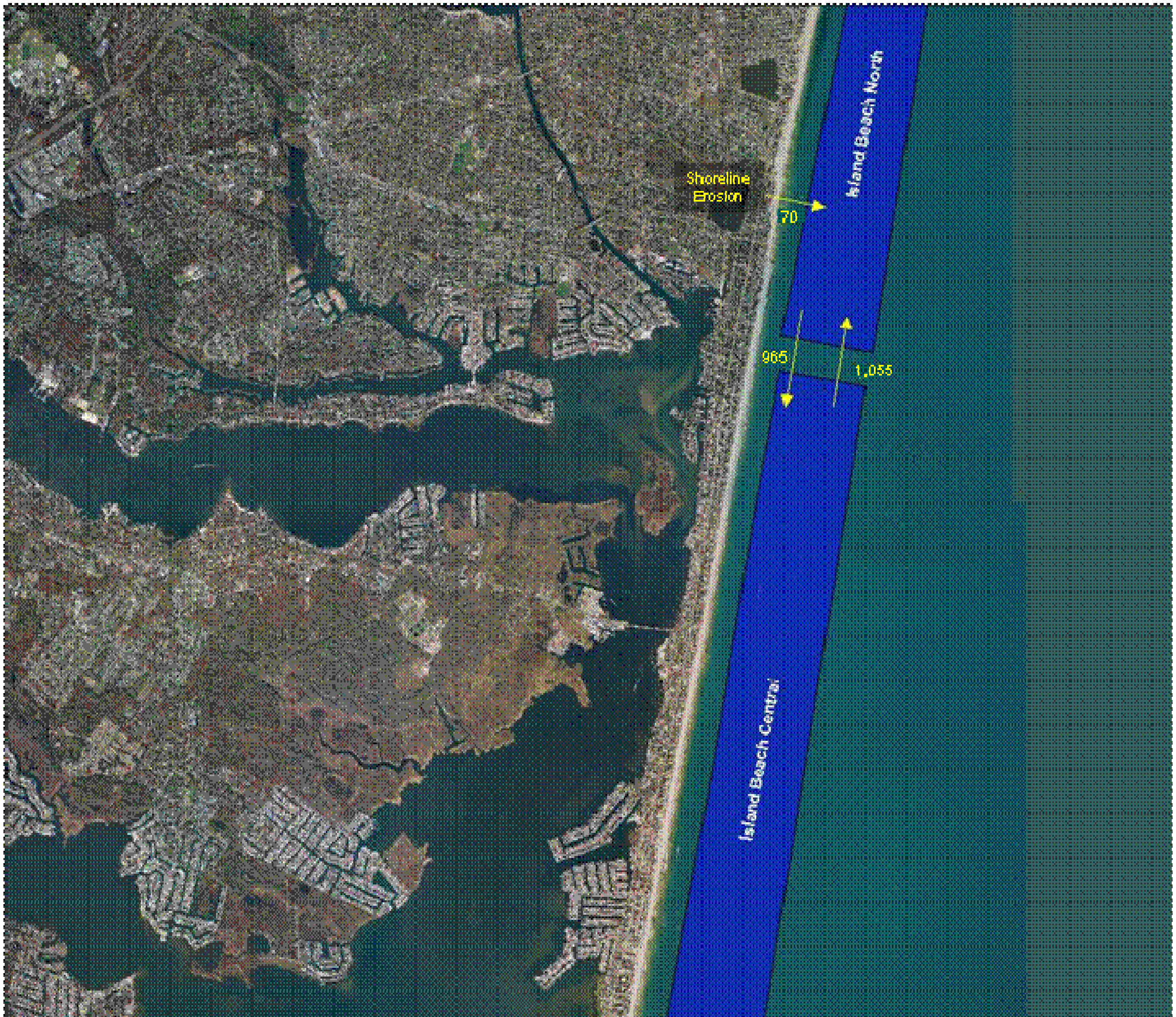

Figure 17. Sediment Budget for North Island Beach (1000x yds^3 / yr)

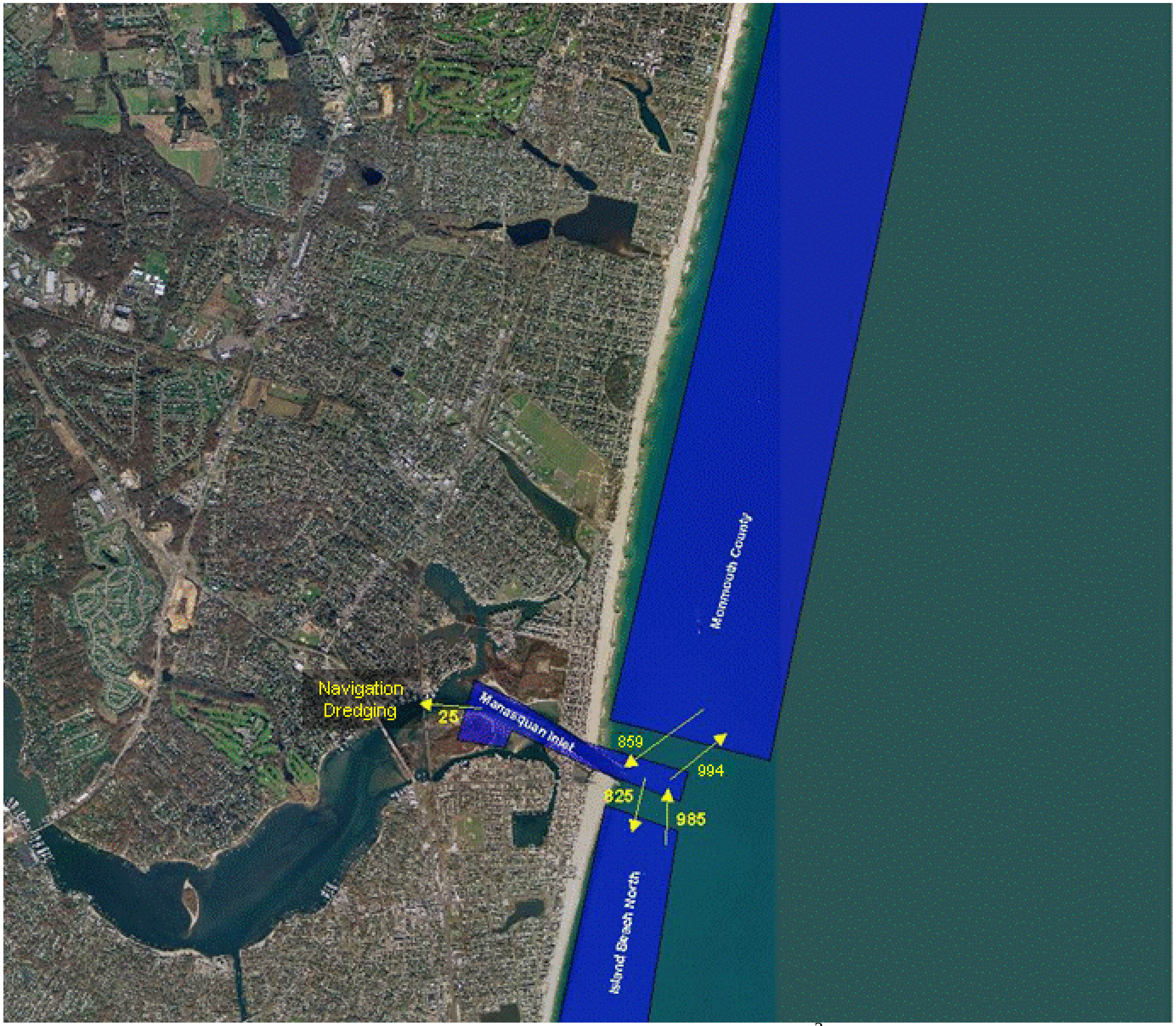

Figure 18. Sediment Budget for Manasquan Inlet and Vicinity (1000x yds^3 / yr)

CONCLUSIONS

The results of the regional sediment budget were compared to previously published sediment budgets and transport rates within the region. The sediment budgets used for comparison were:

Little Egg Inlet to Great Egg Inlet 1986 – 1993 from the Absecon Island Interim Feasibility Study dated August 1996.

Great Egg Inlet to Townsends Inlet 1986 – 1997 from the Great Egg Inlet to Townsends Inlet Feasibility Study dated December 2000.

Corson Inlet to North Wildwood 1986 – 1993 from the Townsends Inlet to Cape May Inlet Feasibility Study dated March 1992.

Hereford Inlet to Cape May Point 1986 – 1998 from the Cape May Inlet Sand Bypass Sediment Budget Report dated October 2001.

There has not been any recent sediment budgets developed from Manasquan Inlet to Little Egg Inlet. However, longshore sediment transports rates and shoreline change quantities were calculated for the region using varies methodologies and techniques as summarized in the Manasquan Inlet to Barnegat Inlet Feasibility Study and the Barnegat Inlet to Little Egg Inlet Feasibility Study. The longshore transport rates and shoreline change quantities calculated as part of this effort were compared to the values published in these reports.

The results from this regional sediment budget compare very well to the results from the previous reports. Net transport directions coincide with the previous results and magnitudes for longshore sediment transport and shoreline change are consistently within the same order of magnitude. Where discrepancies do exist they can be attributable to the techniques used to balance the budget and the applied uncertainty ranges. No previously published sediment budget or longshore sediment transport calculation from the sources listed previously took into account uncertainty.

The purpose of this regional sediment budget was to capture general trends in sediment patterns and provide approximate magnitudes of sediment flux and volume change at a regional scale. Consistent uniform methodologies and procedures at a regional scale were applied in calculating shoreline change, wave transformation, bathymetric change, and sediment budget balancing. In the past, project-scale sediment budgets had differing assumptions, timeframes, and used different methodologies from one another. This resulted in confusion and inconsistencies at the sediment budget boundaries when they were joined together in a regional scale.

There were many data gaps encountered during the development of this budget that added to the difficulty in balancing the budget control volumes. The data gaps included a lack of historical hydrographic surveys in the inlets, poor survey coverage of inlet shoal complexes, and a lack of a historical dredging database of the coastal navigation and beachfill projects at the

District. Without these surveys and records, assumptions and extrapolations had to be made regarding the rates of shoal growth/reduction and historical dredging quantities. Developing an inlet survey program within the District which specifies complete inlet coverage and not just navigation channels along with better recordkeeping of all dredging activities along the coast will minimize these data gaps in the future.

It was assumed during the development of the sediment budget that further refinement would be done in the future with numerical modeling of shoreline change, wave transformation, and current interaction at both a regional and local scale. Numerical modeling would reduce the uncertainty attached to the quantities calculated for this sediment budget by taking into account the coastal structures that were not considered during the shoreline change and longshore sediment transport analyses. The numerical modeling would also “fill in” the data gaps that exist at the inlets due to a lack of collected data. This regional sediment budget can serve as a “starting point” for further investigations. The framework/control volumes established as part of this work can be used for future regional and local sediment budgets that may be developed.

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