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TITLE Task 01 – Dredging Demand Memo
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TO Stone Harbor
COPY NJDOT OMR; Files
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1 Objective

The objective of this task is to identify the 10-year dredging demand within the project area for planning purposes. The 10-year dredging demand quantifies the cumulative dredging volume to be included in the Dredged Material Management Plan (DMMP). Because the schedule and number of discrete dredging events are dependent on financial, regulatory, and logistical constraints, prediction of discrete events are beyond the scope of this document.

2 Project Area

The Borough of Stone Harbor is located on Seven Mile Island in Cape May County, New Jersey. The project area focuses on the man-made lagoons, marina slips, and residential slips located within the limits of Stone Harbor. The figure below identifies the primary limits of the project area. Consideration of the Federal New Jersey Intracoastal Waterway (NJIWW) and State channels identified by the federal and state agencies near Seven Mile Island are also included based on input from the agencies that have historically dredged those areas.



Figure 1 - Stone Harbor DMMP Project Area

3 Dredging Demand

OCC divided the dredging demand into four (4) categories: federal, state, municipal, and private and based the categorization on the entity that has historically conducted the dredging and not necessarily the owner of said waterways.¹ For example, the NJIWW is located in State waters however, it is a federally authorized navigation project; the USACE has historically dredged this waterway

¹ The State of New Jersey claims ownership to the tidelands (riparian lands) that are defined as all lands that are currently and formerly flowed by the mean high tide of a natural waterway. The NJDEP Tidelands Resource Council manages the tidelands and may issue grants, licenses, or leases to utilize these waterways. ¹

as part of their navigation responsibilities and therefore OCC categorized it as a federal waterway for this analysis

OCC coordinated with state and federal agencies to obtain their maintenance dredging demand in channels and anchorages surrounding the project area. To assess the municipal and private dredging demand, OCC utilized historical Stone Harbor Lagoon dredging data provided by Stone Harbor and recent hydrographic surveys. The Richard Stockton College of New Jersey Coastal Research Center (CRC) surveyed the Stone Harbor Lagoons on 8 May 2014. The USACE surveyed the NJIWW near Seven Mile Island on 15-16 August 2013.

3.1 Federal Waterways

In 1939, the federal government authorized the United States Army Corps of Engineers (USACE) to maintain the New Jersey Intracoastal Waterway (NJIWW) at a depth of six (6) feet below mean lower low water (MLLW). The NJIWW includes the following channels between Hereford Inlet and Townsends Inlet (south to north): Great Flat Thoroughfare, Great Channel, Gull Island Thoroughfare, Great Sound, Paddy Thoroughfare, and Ingram Thoroughfare. The NOAA map below highlights these channels.

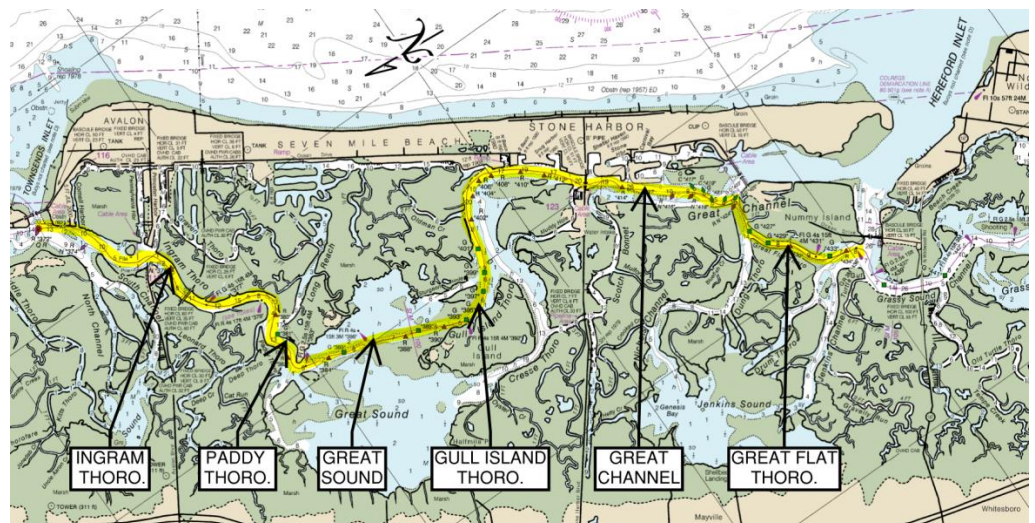


Figure 2 - USACE NJIWW highlighted near Seven Mile Island

Monica Chasten, USACE Philadelphia District, provided the current dredging demand of federal waterways near Seven Mile Island on 7 April 2014. The NJIWW Final Site Selection Report (IT 2001) provided USACE historical dredging records from 1973 to 2000.

The Grassy Sound Channel (“Football Field”) is located north of Stone Harbor. Stone Harbor residents traverse this channel when traveling north along the NJIWW to Townsends Inlet. This channel has a current dredging need of approximately 80,000 cubic yards of fine-grained material (silt and clay). Historically, the USACE dredged between 30,000 and 120,000 cubic yards from this channel every two (2) to four (4) years. OCC estimates the 10-year dredging demand for the Grassy Sound Channel to be approximately 150,000 cubic yards.

The Great Flat Thoroughfare is located south of Stone Harbor. Stone Harbor residents traverse this channel when traveling south along the NJIWW to the Wildwoods and Cape May Harbor. This channel has a current dredging demand of approximately 7,000 cubic yards of coarse-grained material (sand). Historically, the USACE dredges between 6,000 and 15,000 cubic yards from this channel every three (3) to seven (7) years. OCC estimates the 10-year dredging demand for the Great Flat Thoroughfare to be approximately 25,000 cubic yards.

OCC estimates the 10-year dredging demand for federal waterways to be approximately 175,000 cubic yards.

3.2 State Waterways

The state of New Jersey has charged the New Jersey Department of Transportation Office of Maritime Resources (NJDOT OMR) with the management of the marine transportation network including state navigation channels. On 7 April 2014, Genevieve Clifton of NJDOT OMR informed OCC that there are no “State channels” that are actively maintained near the project area. Also, NJDOT OMR does not anticipate State dredging in the next 10 years near the project area. Therefore, the State does not have a current or 10-year dredging need demand near the project area.

3.3 Municipal Waterways

The network of waterways surrounding Stone Harbor is an essential component of the local economy and environment. Stone Harbor has taken on the responsibility of managing the waterways used by its residents to access the NJIWW. These waterways primarily exist within nine (9) lagoons that are a combination of natural, man-

made, and filled waterways². The figure below identifies each of the lagoons. In addition to the lagoons, an access channel that connects Paradise Bay, Sanctuary Bay, Carnival Bay, and Pleasure Bay to the NJIWW is also included in the group of municipal waterways.

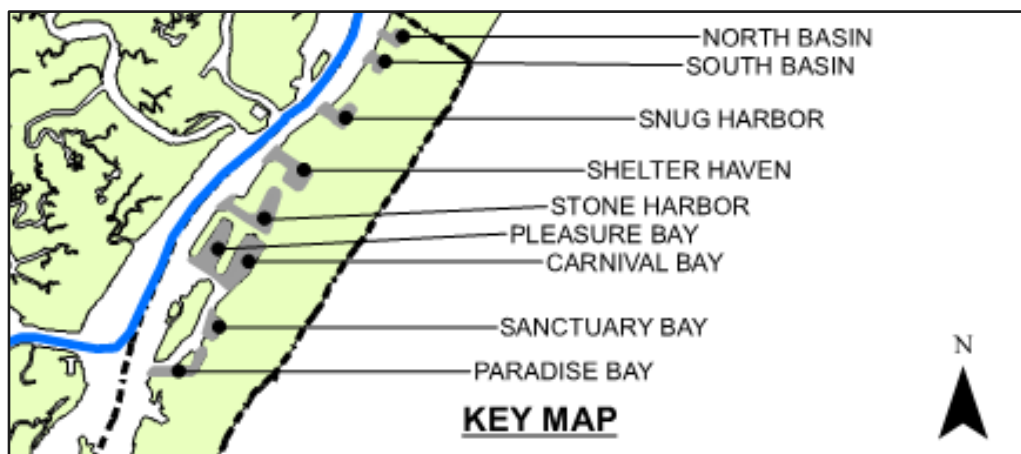


Figure 3 - Stone Harbor Lagoons

OCC calculated the May 2014 dredging demand for the municipal waterways identified above. The table below summarizes the available volume of dredged material between the May 2014 hydrographic survey data and a design dredge depth of six (6) feet below MLLW plus two (2) feet of allowable overdepth. The Appendix includes a detailed description of the dredge volume calculation input and methodology. Figures showing the dredging limits, existing depths, and areas in need of dredging are also included in the Appendix.

² Based on the Tidelands Conveyance Maps for the Borough of Stone Harbor, New Jersey has issued grants for the following Stone Harbor Lagoons: Stone Harbor, Pleasure Bay, Carnival Bay, Sanctuary Bay, and Paradise Bay. The State owns the areas of the remaining lagoons that were once or are presently flowed by the tide.

Table 1 - Dredging Demand, May 2014

DREDGE AREA	VOLUME TO 6 FT MLLW [CY]	VOLUME TO 2 FT OD [CY]	TOTAL DREDGE VOLUME [CY]
North Basin	17,500	5,400	22,900
South Basin	7,800	6,200	14,000
Snug Harbor	9,100	11,400	20,500
Shelter Haven	10,800	9,000	19,800
Stone Harbor	4,200	4,300	8,500
Pleasure Bay	3,000	22,800	25,800
Carnival Bay	5,500	30,700	36,200
Sanctuary Bay	7,100	10,500	17,600
Paradise Bay	4,200	9,200	13,400
Access Channel	1,400	19,500	20,900
TOTAL	70,600	129,000	199,600

The previous Stone Harbor Lagoon dredging project was completed in 2003. Stone Harbor dredged the nine (9) lagoons to a depth of six (6) feet below MLLW plus two (2) feet of allowable overdepth. The table below provides a summary of the actual volume removed from each lagoon.

Table 2 - 2003 Stone Harbor Lagoon Dredging Summary

DREDGE AREA	TOTAL VOLUME DREDGED TO 6 FT MLLW PLUS 2 FT OD [CY]
North Basin	5,700
South Basin	6,800
Snug Harbor	9,300
Shelter Haven	8,800
Stone Harbor	2,200
Pleasure Bay	23,500
Carnival Bay	19,900
Sanctuary Bay	19,100
Paradise Bay	9,500
TOTAL	104,800

OCC estimates a 10-year dredging demand for the Stone Harbor Lagoons to be approximately 150,000 cubic yards. Note that the 10-year dredging demand is less than the May 2014 total volume of dredged material available to be dredged to a depth of six (6) feet MLLW plus two (2) feet of overdepth. This is because contractors do not typically remove all of the overdepth material while dredging.

3.4 Private Waterways

The private waterways are located between the municipal dredge area and the bulkhead line. This area contains residential slips and

marinas. Historical dredging records for this area are limited. To estimate the current dredging demand, the August 2014 survey data was extrapolated to the bulkhead line with an assumption that the average depth at the bulkhead is three (3) feet MLLW. The design dredge template was reduced to four (4) feet MLLW plus two (2) feet of overdepth because this is an average draft for recreational vessels. Additionally, OCC assumed that only 20% of the dredge area less than the design dredge depth would be dredged because the slips only occupy a fraction of the total area and an assumption that some residents will elect not to perform dredging. Based on these assumptions, OCC calculated the August 2014 private waterway dredging demand to be 18,614 cubic yards.

OCC estimates a 10-year dredging demand for the private waterways to be approximately 20,000 cubic yards.

4 Summary

OCC estimates that over the next 10-years, federal, state, and local stakeholders will need to work together to manage approximately 345,000 cubic yards of dredged material in the project area. OCC estimates that Stone Harbor and its residents will generate approximately 170,000 cubic yards of dredged material over the next 10 years. The table below summarizes dredging quantities for each source.

Table 3 - Dredging Demand Summary

WATERWAYS	10 YEAR DREDGING DEMAND [CY]
Federal	175,000
State	0
Municipal	150,000
Private	20,000
TOTAL	345,000

The management of this material through placement and beneficial reuse is critical to maintaining these waterways with dredging activities. In Task 2 of this project, OCC will identify and evaluate dredged material placement alternatives to manage the projected dredging demand.

5 References

IT Corporation. New Jersey Intracoastal Waterway Final Site Selection Report. Prepared for the USACE Philadelphia District December 2001.

USACE. Engineering Manual 1110-2-1003 Hydrographic Surveying. November 2013.

6 Appendix

6.1 Dredge Volume Calculation

OCC used the following methodology to calculate the dredging volumes.

Software Used

ArcGIS 10.1 – 3D Analyst

Dredging Limits

The municipal waterway limits of dredging were defined at a 10-foot offset from the limits of the piers (pier head line) as determined from an interpretation of 2013 aerial photography.

The private waterway limits of dredging were defined as the area between the bulkhead line and the municipal dredging limits.

Hydrographic Survey Data

All hydrographic data utilized NAD83 State Plan New Jersey feet and USACE MLLW feet. USACE MLLW is defined by the USACE as 2.41 feet below NAVD88.

OCC combined the USACE 2013 NJIWW and the CRC 2014 Lagoon data for analysis. A single TIN surface was created for the survey data. The following assumptions were made in the development of the TIN. The water depth at the bulkhead line was three (3) feet below MLLW. The water depth at natural shorelines (i.e. Sedge Island) was 0 feet MLLW.

Dredge Design Template

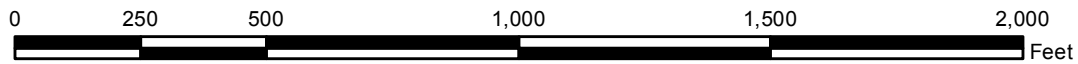
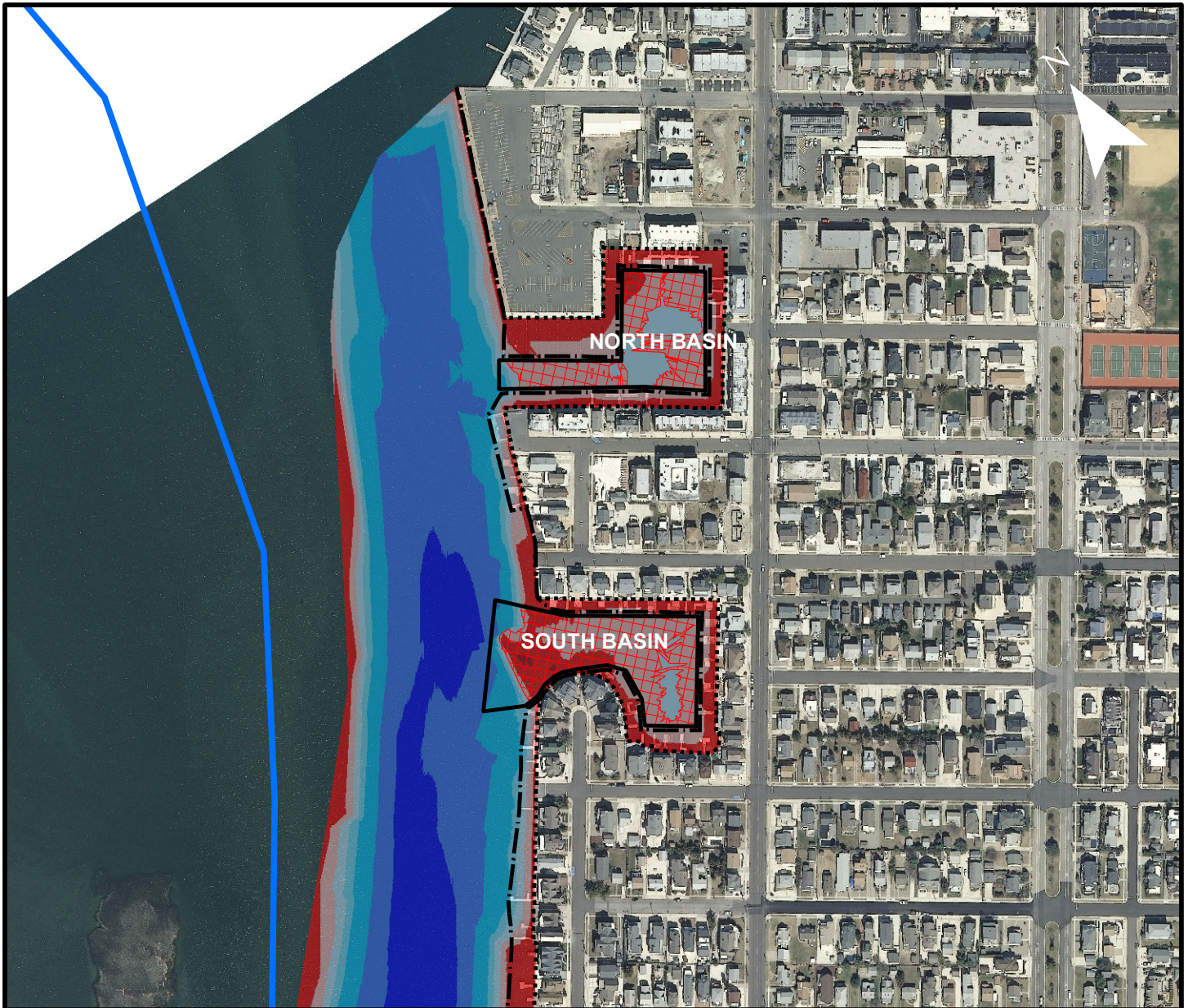
For the municipal waterways, a design dredge depth of six (6) feet below MLLW plus two (2) feet of allowable overdepth was set within the dredging limits.

For the private waterways, a design dredge depth of four (4) feet below MLLW plus two (2) feet of allowable overdepth was set within the dredging limits.

Volume Calculation

The polygon volume tool was used to calculate the volume between the surface and the dredge area at various depths. This method utilizes a box cut and the All method as defined in USACE EM 1110-2-1003 (2013). The volumes calculated in this analysis only represent the conditions at the time of survey.

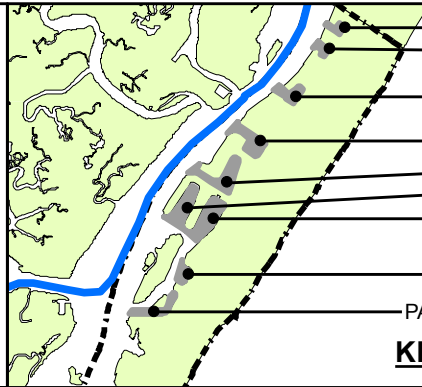
6.2 Figures



LEGEND

LIMITS OF DREDGING WATER DEPTH [FT]

	DREDGE AREA [6FT]		>20
	EST. PIERHEAD LINE		15 - 20
	EST. BULKHEAD LINE		10 - 15
	NJICWW		8 - 10
			6 - 8
			4 - 6
			2 - 4
			<2

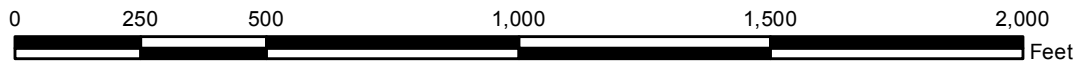
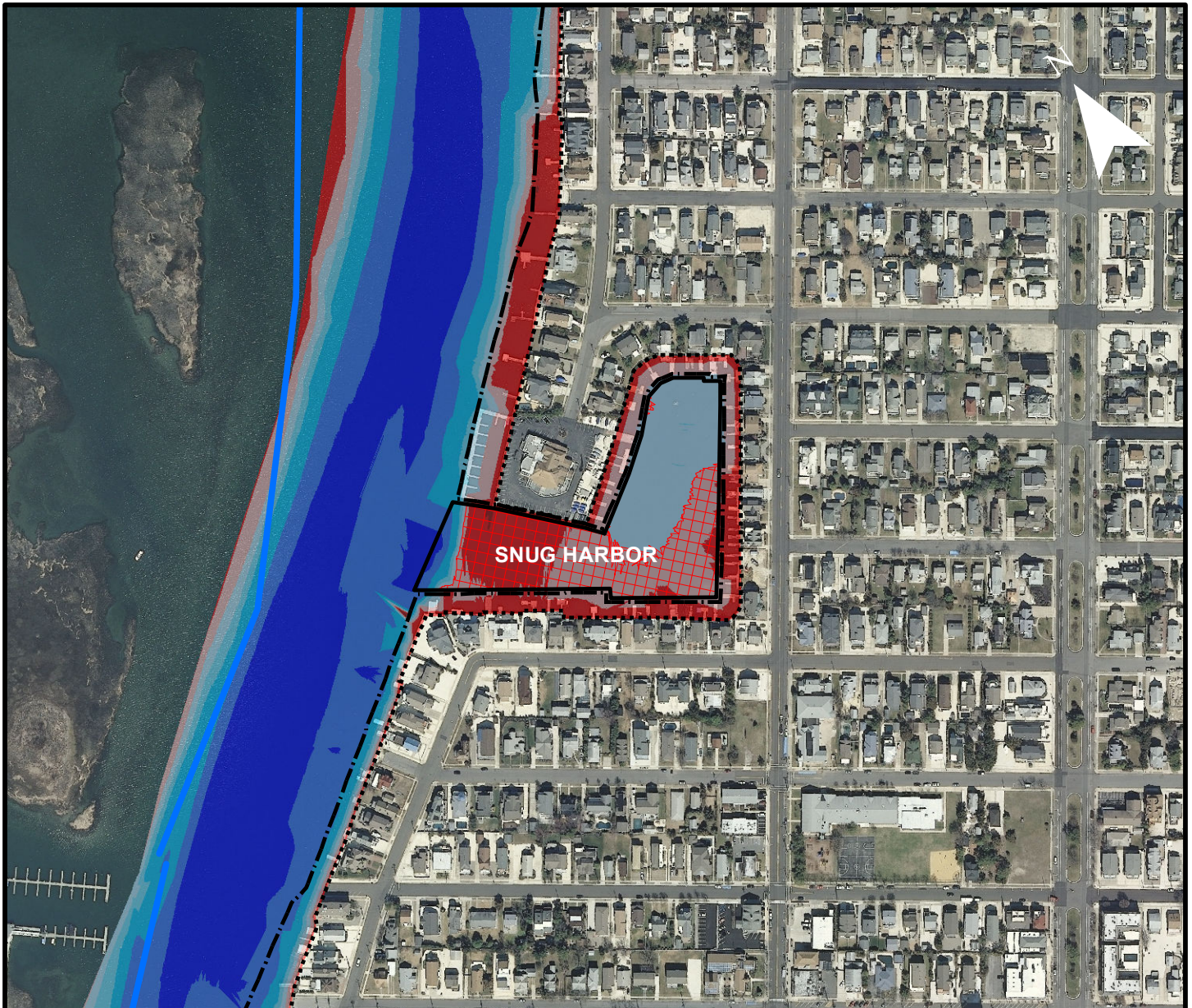


KEY MAP

STONE HARBOR DMMP
NORTH BASIN AND SOUTH BASIN

NOTES:
DREDGE AREA IS APPROXIMATELY 10 FEET FROM APPROXIMATE PIERHEAD LINE
WATERDEPTH AT BULKHEAD ASSUMED TO BE 3FT
HYDROGRAPHIC SURVEY OF STONE HARBOR LAGOONS COLLECTED BY RICHARD STOCKTON COLLEGE OF NEW JERSEY COASTAL RESEARCH CENTER ON MAY 8, 2014 AND ONLY REFLECT THE CONDITIONS AT THE TIME OF SURVEY
HYDROGRAPHIC SURVEY OF NJICWW COLLECTED BY USACE ON AUGUST 15 AND 16, 2013 AND ONLY REFLECT THE CONDITIONS AT THE TIME OF SURVEY
VERTICAL DATUM IS USACE MLLW WHICH IS 2.41 FEET BELOW NAVD88

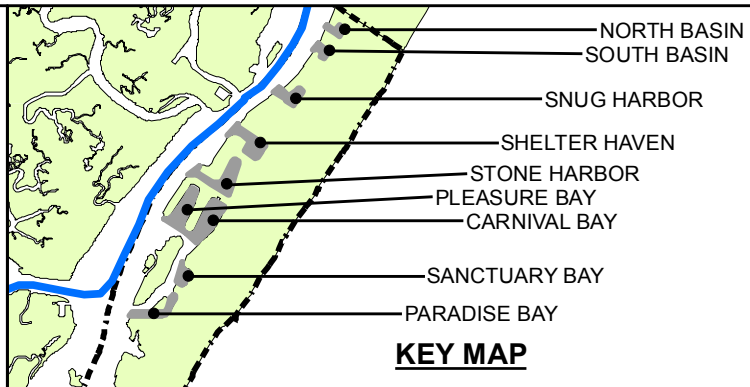
FIGURE 1 REV 0 DATE: 6/9/2014



LEGEND

LIMITS OF DREDGING WATER DEPTH [FT]

	DREDGE AREA [6FT]		>20
	EST. PIERHEAD LINE		15 - 20
	EST. BULKHEAD LINE		10 - 15
	NJICWW		8 - 10
			6 - 8
			4 - 6
			2 - 4
			<2

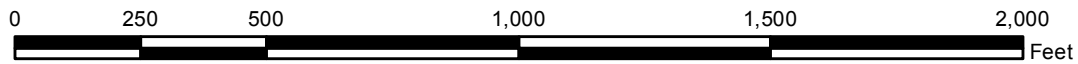
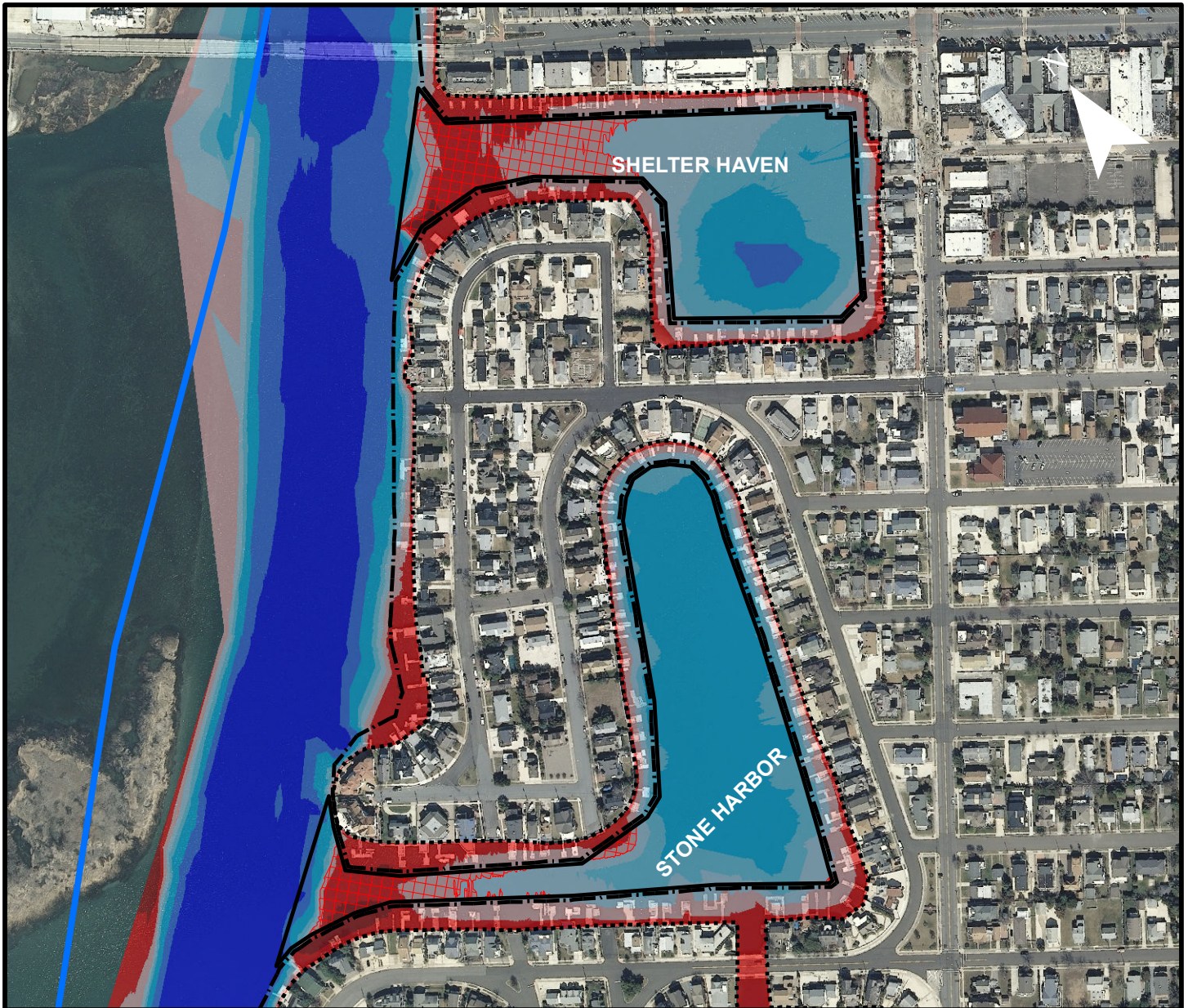


STONE HARBOR DMMP

SNUG HARBOR

FIGURE 2 REV 0 DATE: 6/9/2014

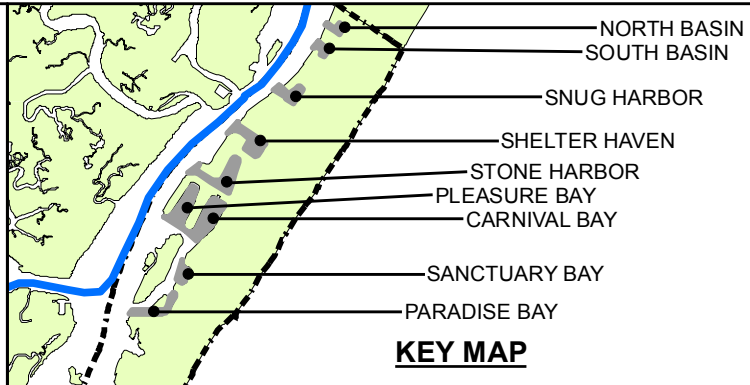
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LIMITS OF DREDGING WATER DEPTH [FT]

	DREDGE AREA [6FT]		>20
	EST. PIERHEAD LINE		15 - 20
	EST. BULKHEAD LINE		10 - 15
	NJICWW		8 - 10
			6 - 8
			4 - 6
			2 - 4
			<2

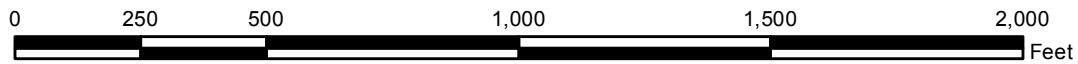
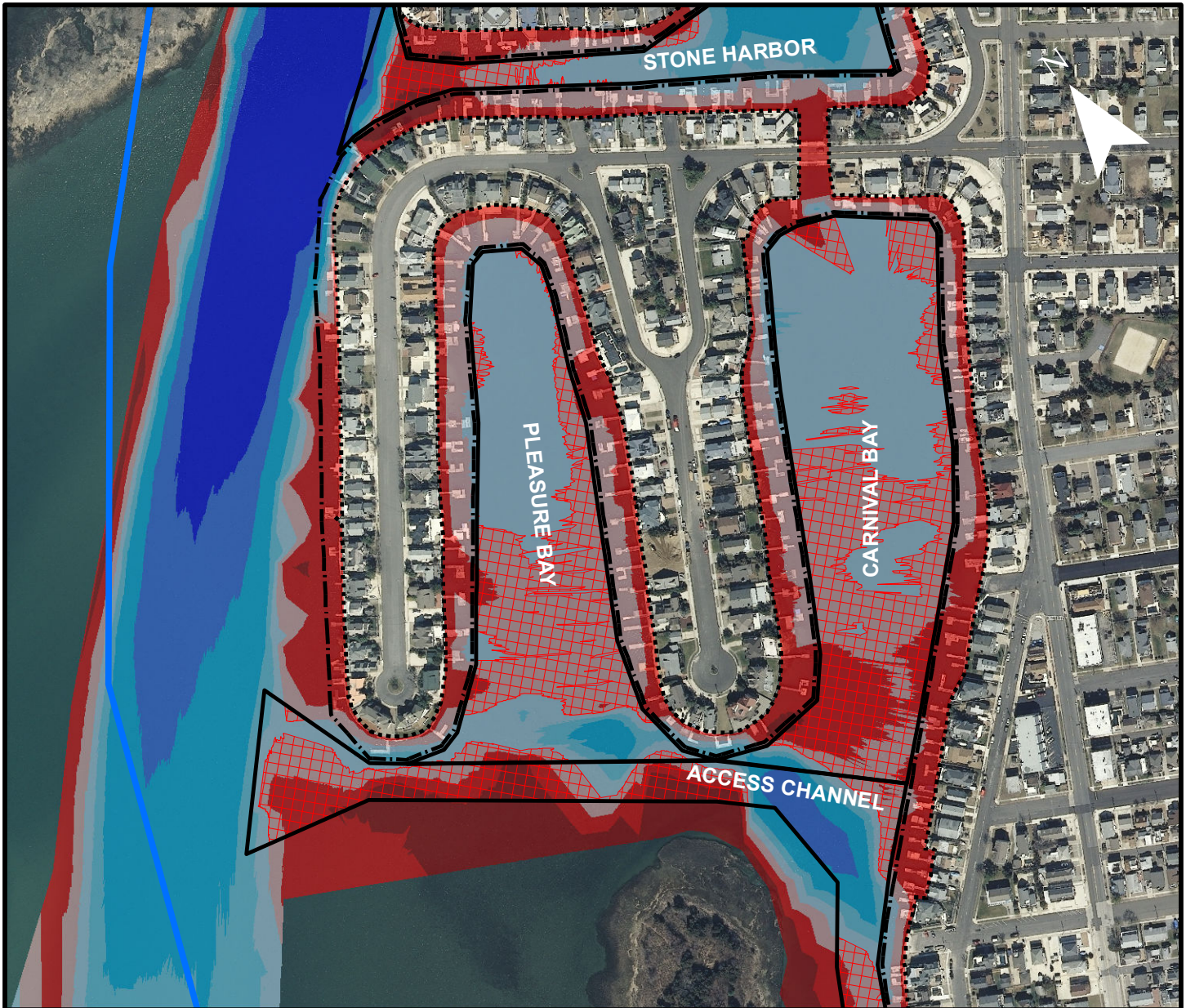


STONE HARBOR DMMP

SHELTER HAVEN AND STONE HARBOR

FIGURE 3 REV 0 DATE: 6/9/2014

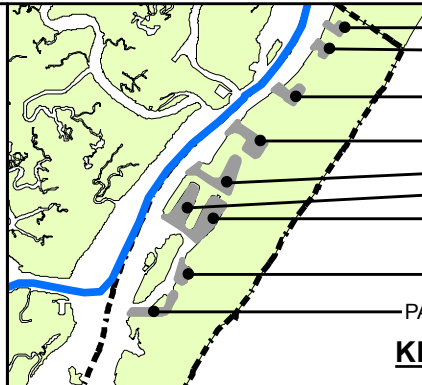
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	DREDGE AREA [6FT]		>20
	EST. PIERHEAD LINE		15 - 20
	EST. BULKHEAD LINE		10 - 15
	NJICWW		8 - 10
			6 - 8
			4 - 6
			2 - 4
			<2



KEY MAP



STONE HARBOR DMMP

PLEASURE BAY AND CARNIVAL BAY

NOTES:
DREDGE AREA IS APPROXIMATELY 10 FEET FROM APPROXIMATE PIERHEAD LINE

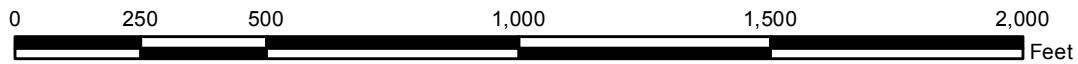
WATERDEPTH AT BULKHEAD ASSUMED TO BE 3FT

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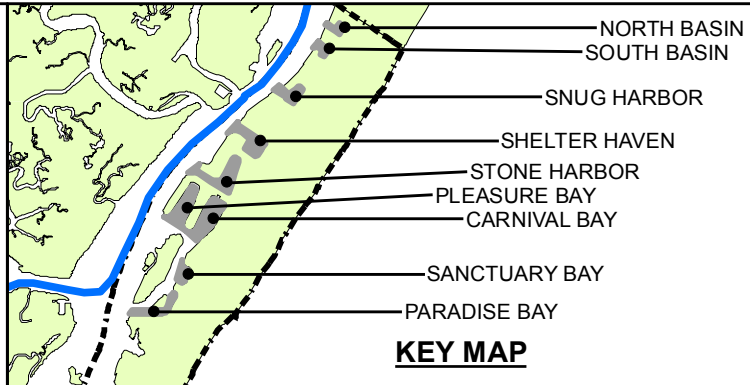
FIGURE 4 REV 0 DATE: 6/9/2014



LEGEND

LIMITS OF DREDGING WATER DEPTH [FT]

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	EST. BULKHEAD LINE		10 - 15
	NJICWW		8 - 10
			6 - 8
			4 - 6
			2 - 4
			<2

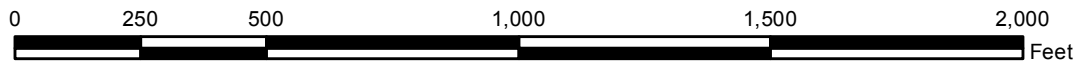
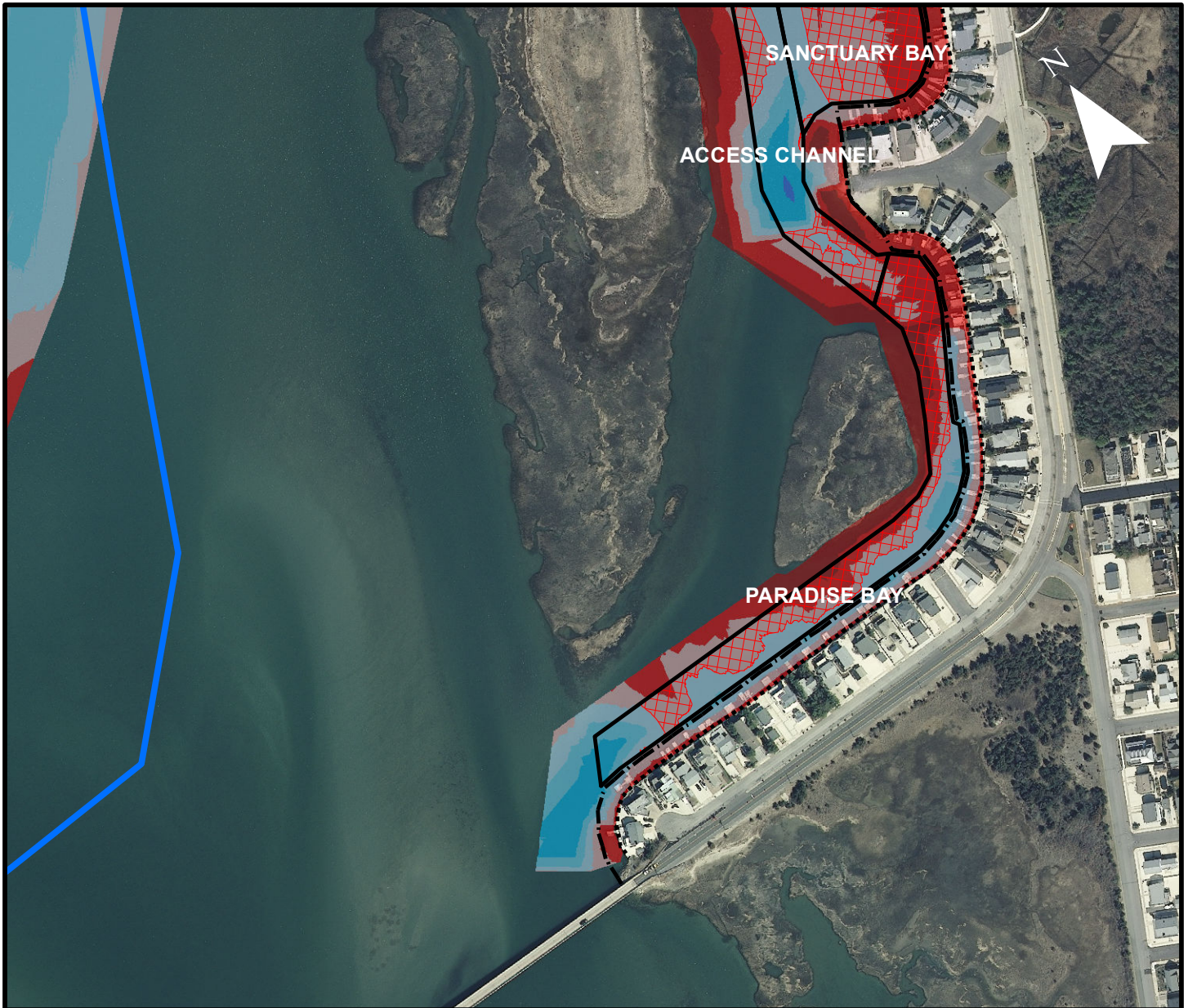


STONE HARBOR DMMP

SANCTUARY BAY

FIGURE 5 REV 0 DATE: 6/9/2014

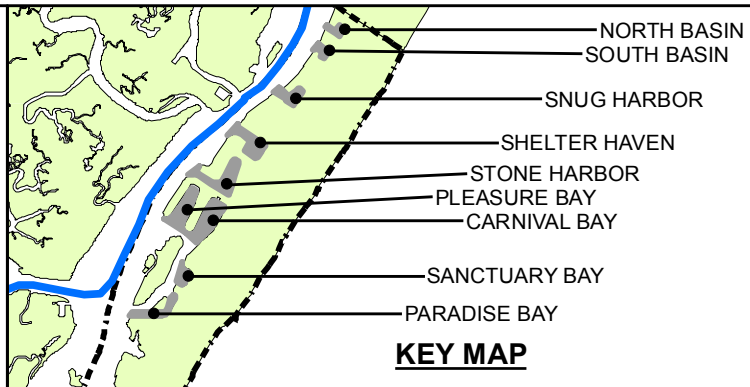
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	EST. PIERHEAD LINE		15 - 20
	EST. BULKHEAD LINE		10 - 15
	NJICWW		8 - 10
			6 - 8
			4 - 6
			2 - 4
			<2



STONE HARBOR DMMP

PARADISE BAY

FIGURE 6 REV 0 DATE: 6/9/2014

NOTES:
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