

BACKGROUND

The Channel between Tinicum and Little Tinicum Island serves to connect the marine district of Tinicum Township with the main navigational channel of the Delaware River. The Channel also serves as the runway for the Philadelphia Seaplane Base. The Marine District includes approximately 15 public and private marinas with direct access to the Delaware River. In addition the Township Emergency Services provide rescue services to the river from a boat ramp at the Historic Lazaretto Site. The waterfront provides a regional access point to the river for recreational boaters, water skiers, jet skis, etc. Recreational and Sports fishing enthusiasts are provided with opportunities to access the Delaware Bay and inter coastal waterway fishing areas. The coastal zone along the banks of the Delaware River contains some the best examples of Tidal Mudflat Wetlands. These areas provide habitat for many species of wildlife and plants. The navigable channel, with access to the marinas, provides for controlled access points through these areas, allowing for the protection of these vital natural resources and providing recreational opportunities for the naturalist while allowing for the continued operations of the marina district which has continually operated for decades.

The owners and operators of the public and private marinas have since the early 1970's noted the depositing of silt along the shoreline and within the areas between the docks and the Channel which has accelerated over the last 10 to 15 years. The first course of action to keep the marinas operational included extending the docks further towards Little Tinicum Island to provide access to the Channel that connects to the Main Channel of the Delaware River. More recently the owners and operators have noted that the previously extended docks are silting in. The rate of deposition of the silt appears to be increasing each year. The marine district has asked the Township to determine the cause of the silt deposition and the feasibility of solutions to the problem.

The loss of the use of the channel for access to the Delaware River will cause economic hardship to the aging waterfront district in the region. The economic impact will reach well beyond those facilities that provide direct access to the river, to related businesses, such as: restaurants, hotels, and boat yard storage and repair services. Restoration of the Channel for the Marina District will allow the area to become a destination for mariners, other related business including local tour guides, antiques, bicycle rentals, boutique shops and other on-shore activities that will be attracted to a viable marine district.

Loss of access to the Delaware for Emergency Services could be the direct result of siltation. This service is a very important benefit to the community provided by the functioning Channel. Tinicum Township is currently undertaking the completion of a \$9,000,000.00 facility adjacent to the River which will house the Township's Emergency Services and an evacuation center. The facility will be a focal point during emergencies that may arise on the River or in the region. Access to this facility by larger vessels, including those operated by the U.S. Coast Guard and Navy will allow for the evacuation of stranded or disabled mariners on the River in times of need. The access provided by this channel provides benefits on a regional basis for a crucial segment of an important east coast waterway.

RIVER FLOW

The Delaware River is tidal within the marine district. The mean low tide elevation is -2.36 (NGVD29) and the mean high tide elevation is 3.16 (NGVD29). In an effort to document the phenomenon that was noted by the marina owners and operators and determine a possible cause the Township chose to conduct a study of the flow readings or velocity of the River during a tide cycle. This methodology was chosen because a previous flow study was completed in 1992 as part of a US Army Corps of Engineers and PaDEP joint permit application to permit construction of the Riverfront, Inc. Marina and would provide a basis for comparison. The study was completed by S.T. Hudson Engineers, Inc. of Camden, N.J. on May 18, 1992. A copy of this study is attached (see Appendix 1.) The new study was also completed by S.T. Hudson Engineers, Inc. on March 7, 2007. A copy of this study is attached (see Appendix 2.) This date was chosen based on the similar tidal pattern of the 1992 study. Readings were taken on one hour intervals at the same locations as the 1992 study at an inshore and outshore location at the surface, mid water and approximately one foot above the bottom. In addition a hydrographic survey was completed with the new study. The following chart provides for comparison of the readings from the two studies.

FLOW READINGS ON THE DELAWARE RIVER AT ESSINGTON, PA

TIME	OUTSHORE					INSHORE			
	May-92		Mar-07			May-92		Mar-07	
	DEPTH (FT)	VELOCITY (FT/SEC)	DEPTH (FT)	VELOCITY (FT/SEC)		DEPTH (FT)	VELOCITY (FT/SEC)	DEPTH (FT)	VELOCITY (FT/SEC)
7:00	1	1.5	1	0.7	EBB	1	1.0	1	0.7
	10	1.5	10	0.7		5	0.9	5	0.7
	19	1.1	18	0.6		8	0.5	10	0.5
8:00	1	1.5	1	0.4	EBB	1	0.6	1	0.6
	10	1.3	10	0.6		5	0.4	5	0.6
	18	0.9	18	0.6		10	0.4	8	0.5
9:00	1	0.7	1	0.4	EBB	1	0.4	1	0.4
	10	0.6	10	0.4		5	0.3	5	0.4
	17	0.5	17	0.4		10	0.3	8	0.3
10:00	1	0.8	1	0.1	Low Tide Both	1	0.3	1	0.0
	10	0.7	5	0.1		5	0.0	5	0.0
	16	0.4	17	0.0		9	0.0	8	0.5
11:00	1	.7-1	1	0.7	Flood	1	1.0	1	0.7
	10	0.9	10	0.8		5	1.0	5	0.7
	16	0.8	18	0.7		10	0.2	10	0.7
12:00	1	1.8-2.1	1	0.9	Flood	1	0.9	1	0.9
	10	1.8-2.3	10	0.9		5	1.0	5	0.9
	19	1.7	20	0.7		11	0.8	10	0.7
13:00	1	2.2	1	1.0	Flood	1	1.0	1	0.9
	10	1.8	10	1.0		5	0.9	5	1.2
	20	1.7	20	1.0		13	0.6	12	1.2
14:00	1	2.3	1	1.0	Flood	1	1.1	1	1.0
	10	1.8	10	1.0		5	0.9	5	1.0
	20	1.5	22	0.9		15	0.5	12	1.0
15:00	1	1.6	1	0.7	Flood	1	0.6	1	0.8
	10	1.5	10	0.8		5	0.8	5	0.8
	21	0.8	22	0.6		16	0.5	12	0.7

RECOMMENDATIONS

It may appear prudent, due to the more recent recommendation to dredge the Main Channel of the Delaware River to increase the shipping capacity of the region, that the back channel and marina areas be dredged as part of that project. The size and scope of the dredging project to provide for the continued use of the marina district in Tinicum is a significantly large project which is beyond the capability of any Local Agency to fund. The scale of the project will require coordination of many Federal, State, and Local agencies and organizations in both the public sector and private sector. The lead role may very well be held by the U.S. Army Corps of Engineers, a federal agency. Many of the necessary prerequisites will be completed as part of the larger project, thereby taking advantage of the economy of scale.

It would also appear to be prudent to review the possible connection of a dredging pipe previously installed to provide fill material for an expansion project at the Philadelphia International Airport in the 1970's. Mariners have reported shallow depths around the pipe at the northern entrance to the back channel. It is not clear if this pipe creates an obstruction that may be contributing to the reduced velocities however, it may be prudent to remove portions if not all of the pipe.

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	DEPTH	VELOCITY	DEPTH	VELOCITY		DEPTH	VELOCITY	DEPTH	VELOCITY
	(FT)	(FT/SEC)	(FT)	(FT/SEC)		(FT)	(FT/SEC)	(FT)	(FT/SEC)
7:00	1	1.5	1	0.7	EBB	1	1.0	1	0.7
	10	1.5	10	0.7		5	0.9	5	0.7
	19	1.1	18	0.6		8	0.5	10	0.5
8:00	1	1.5	1	0.4	EBB	1	0.6	1	0.6
	10	1.3	10	0.6		5	0.4	5	0.6
	18	0.9	18	0.6		10	0.4	8	0.5
9:00	1	0.7	1	0.4	EBB	1	0.4	1	0.4
	10	0.6	10	0.4		5	0.3	5	0.4
	17	0.5	17	0.4		10	0.3	8	0.3
10:00	1	0.8	1	0.1	Low Tide Both	1	0.3	1	0.0
	10	0.7	5	0.1		5	0.0	5	0.0
	16	0.4	17	0.0		9	0.0	8	0.5
11:00	1	.7-1	1	0.7	Flood	1	1.0	1	0.7
	10	0.9	10	0.8		5	1.0	5	0.7
	16	0.8	18	0.7		10	0.2	10	0.7
12:00	1	1.8-2.1	1	0.9	Flood	1	0.9	1	0.9
	10	1.8-2.3	10	0.9		5	1.0	5	0.9
	19	1.7	20	0.7		11	0.8	10	0.7
13:00	1	2.2	1	1.0	Flood	1	1.0	1	0.9
	10	1.8	10	1.0		5	0.9	5	1.2
	20	1.7	20	1.0		13	0.6	12	1.2
14:00	1	2.3	1	1.0	Flood	1	1.1	1	1.0
	10	1.8	10	1.0		5	0.9	5	1.0
	20	1.5	22	0.9		15	0.5	12	1.0
15:00	1	1.6	1	0.7	Flood	1	0.6	1	0.8
	10	1.5	10	0.8		5	0.8	5	0.8
	21	0.8	22	0.6		16	0.5	12	0.7
15:25 - '92 15:30 - '07	1	0.7	1	0.0	Hide Tide 2007	1	0.0	1	0.0
	10	0.4-0.9	10	0.0		5	0.0	5	0.0
	21	0.4	22	0.0		17	0.1	12	0.0
16:00	1	0.0	1	0.1	Hide Tide 1992	1	0.0	1	0.3
	10	0.0	10	0.1		5	0.0	5	0.3
	NR	NR	22	0.1		NR	NR	12	0.3
17:00	1	1.3	1	0.9	EBB	1	0.9	1	1.0
	10	1.5	10	0.8		5	1-1.2	5	1.0
	21	0.8	21	0.8		15	0.7	11	0.7
18:00	1	1.4-1.7	1	1.0	EBB	1	.8-1	1	1.0
	10	1.6	10	0.8		5	1.2	5	1.0
	20	1.1	20	0.8		14	0.5	10	0.7

NR - No Reading