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MALLARD LAKES SUSTAINABILITY
WHAT CAN BE DONE?

ML's sustainability strategy will likely include some or many of the options below. A community-wide feasibility study could be performed by an engineering firm or through the US Army Corps of Engineers (USACE) to determine what specifically needs to be done for ML to ensure long-term sustainability. The study would consider the methods below, and potentially additional solutions. Permits would be required from both the US Corps of Engineers and DNREC – due to the tidal nature of the lake -- but obtaining permits for these types of remediations is routine. (Sources: Envirotech Environmental Consulting, Floodproofing.com, DBF Engineering, Resilient Sustainability Community League (RASCL) Project Guidance Group, US Army Corps of Engineers, Davis, Bowen and Friedel). The cost of a feasibility study by the USACE is estimated to be between $500K to $1M (Source: Scott Sanderson)

- ✓ **Land Stabilization:** Over time, the banks around the tidal lake have become unstable marsh due to water inundation and subsidence. Soil stabilization would need to include hardening (filling) the land under the structures, while minimizing impacts to the wetlands. Land Stabilization could not occur without elevating the structures (Source: Todd Frischman, Sharon Cruz, USACE FID)

- ✓ **Structure Elevation:** Raising buildings to meet current building code elevation levels would effectively reduce flood risks. Land Stabilizing would need to occur in addition to elevating structures to achieve the best flood prevention outcome. (Source: Todd Frischman, Sharon Cruz, USACE FID) . In 2016, USACE performed a Federal Interest Determination, which concluded that Mallard Lakes had a significant need for flood protection (to 100-year or ACE probability of 1%), and the most probable solution was a non-structural measure, "elevation" – i.e. raising of the structures. Implementing this alternative would reduce the risk of storm damage to property and the related issues of public health and safety."

- ✓ **Living Shorelines:** Living shorelines address erosion through natural methods such as plants, sand, shells, and rocks. Additionally, water sills (a submerged structure in a body of water that acts as a barrier to control water flow. Living Shorelines and other methods (e.g., sills) would be part of a larger strategy to reduce flood risks, but would not be the sole method for flood reduction (Source: Lyle De la Rosa, ML Tidal Water Report).

- ✓ **Enhanced Drainage:** Enhancements could potentially be made to the ML drainage system, but the effort would need to be studied to determine how best to address drainage and tidal issues. (Source: Tyler Brown).

- ✓ **Physical Barriers:** Using floodwalls, levees, floodgates, or seawalls to restrict the water. Flood barrier infrastructure could be built at the primary inlet into the tidal lake under Route 54, restricting/regulating water flow into ML during storm surges only. Coordination between federal, state, and county governments is required to determine the feasibility of and for funding for such a project. *The ML HOA Board is exploring a variable flow barrier off of Rt 54 that might still meet wetland requirements while restricting tidal water flow, but it is currently in the exploratory stages (Source: ML Tidal Water Report). Any solution would also have to address the flood risk from the "mosquito ditch" that runs alongside the building closest to Treasure Beach on Eagle Lane (Source: Tyler Brown).*

- ✓ **Dredging:** Dredging can remove sediment within the tidal lake to increase the lake's depth and lower the waterline. To determine whether dredging may be effective for the tidal lake, a "bathymetric" measurement and sediment analysis would need to be performed to determine where and how much dredging needs to occur and where (Source: John Phelps). Sepodiment material removed from the lake could be used to stabilize the wetland shoreline or would have to be disposed of in another manner. Communities must dredge their ponds/lagoons/canals to restore some of the storage capacity that has been lost due to sedimentation. This needs to be done in a scheduled manner (Source: Alistair Probert). The tidal lake has not been dredged because there is a belief that it would continue to refill to the current water level (Source: Stacey Selby).

- ☒ **Smaller Culvert under Rt 54:** Based on conversations with DelDOT (Source: Tricia Arndt), when the Rt 54 culvert was replaced in 2001 when the causeway was created, the new culvert was the exact same size as the previous culvert (48"). She indicated that is was unlikely that there was an obstruction in the previous culvert as DelDOT has a routine maintenance program to ensure effectiveness of their systems, but she could not rule an obstruction out altogether. DelDOT indicated that installing a smaller culvert would be far more likely to clog/become obstructed which will easily cause water issues both upstream and downstream of the culvert. A smaller pipe reduces water flow coming in, but it also slows water coming out if it is operating in a tidal flow manner (Source: Alistair Probert).

- ☒ **Dewatering:** Is the removal of water from a location. This may be done by wet classification, centrifugation, filtration, or similar solid-liquid separation processes, such as removal of residual liquid from a filter cake by a filter press as part of various industrial processes. Water that is removed needs to be cleansed and transported to an approved water disposal area (Source: RASCL PRG) Because the tidal lake is tidal, dewatering does not appear feasible.

☒ **Removing the Connection to the Assawoman Bay:** Now that the tidal area is a wetland and part of the Assawoman Bay, it cannot be reverted to a freshwater storm pond, closed-off or filled-in based on current regulations (Source: Sharon Cruz).

☒ **Dry Floodproofing:** Dry floodproofing measures can seal individual buildings/units to prevent rising tidal water from entering them. These methods might be part of an overall flood mitigation strategy but would likely be cost-prohibitive without funding assistance from the government. *FEMA does not recommend dry floodproofing for wooden residential structures.*

REFERENCES:

Experts:

- Karl Workman, DNREC Division of Watershed Stewardship, Landowner Liaison – Drainage
- Lyle A. de la Rosa, Environmental Project Manager, Envirotech Environmental Consulting, Inc. – DNREC-sponsored Living Seashore provider
- Todd Fritchman, President and CEO of Envirotech Environmental Consulting, Inc.
- John Phelps, Senior Business Development Consultant, Environmental Scientist, Solitude Lake Management Dredging Expert
- Kurt Lueke, Regional Flood Manager, Flood Mitigation Specialist, Floodproofing.com
- Alistair Probert, District Engineer for Sussex County, DelDOT
- Jana Savini, RASCL Project Guidance Group
- Scott Sanderson, US Army Corps of Engineers, Chief Project Development Branch, Environmental Scientist
- Tyler Brown, Environmental Program Manager, DNREC Drainage

Reference Documents:

- USACE Federal Interest Determination (FID), Continuing Authorities Program Section 205, Delaware Bayshores, DE, Flood Risk Management Study, dated April 2016