Village of Bellport Marina

Design Option Matrix

	Option 1: Wave Attenuator	Option 2: Rock Breakwater	Option 3: Wave Fence/Screen (vinyl sheet pile/timber)
Basis of design	» 25 Year Return Interval Storm Occupied (2% chance of occurring) » 50 Year Return Interval Strom Unoccupied (4% chance of occurring) » Sea Level Rise – Year 2050 Projection of 2.25 feet » Design conditions will be finalized in the next phase and structures will be updated accordingly		
Project Components in overall design	» Floating Wave Attenuator » Osborn Park Wall Repair » Rock Dock Wall Repair » Boat Ramp Repair » Ferry/Emergency Vessel Dock Repair	» Rock Breakwater » Osborn Park Wall Repair » Rock Dock Wall Repair » Boat Ramp Repair » Ferry/Emergency Vessel Dock Repair	» Fixed Wave Screen » Osborn Park Wall Repair » Rock Dock Wall Repair » Boat Ramp Repair » Ferry/Emergency Vessel Dock Repair
Cost[i]	» $1.8M » Excludes: » Navigational piles » Navigational lights » Mobilization, site prep, etc.	» $4.13M » Excludes: » Navigational piles » Navigational lights » Mobilization, site prep, etc.	» $500K » Excludes: » Navigational piles » Navigational lights » Mobilization, site prep, etc.
Size	» 260 feet long by 16 feet wide by 6 feet high » 1.5 feet of freeboard for attenuator » Anchor piles will extend up to 10 feet NAVD88 (9.5± feet above MHW) every 20 feet	» 42 feet wide by 292 feet long by 11 feet high » Freeboard of structure is 5± feet at MHW; 6± feet at MLW	» 264 feet long by 3± feet wide by 11 feet high » Freeboard of structure is 5± feet at MHW
Multi-Use/Flexibility	» The attenuator floats come in 20-to-60-foot sections that are held in place by anchor piles. The attenuator can be moved to a new position once installed and sections of dock can also be added later. » The attenuator can be used for only wave attenuation or can also be used for boat mooring, if desirable.	» The rock breakwater is a fixed structure that cannot be moved once installed. » The breakwater can be designed now to accommodate additional dockage in the future, but no mooring is included now.	» The timber wave screen is a fixed structure that cannot be moved once installed. The wave screen is held in place by long piles. » The wave screen can be designed now to accommodate additional dockage in the future, but no mooring is included now.
Maintenance/Safety Life Cycle	» Concrete floating docks are low maintenance and may require some patching of cracks over time. Timber floating docks require yearly maintenance. » A concrete dock is typically expected to last more than 30 years and a timber dock with good maintenance can last 20 to 30 years. » Maintenance of the structure may be required after a storm larger than the design storm.	» Rock breakwaters are low maintenance. Maintenance is only required if sections of the breakwater settle due to poor soils underneath the structure (Geotechnical data will be required for all structures). » A rock structure will remain in place for life, but a rock structure is best at attenuation when the height of the structure prevents overtopping of waves. » Rocks may be shifted or dislodged during a storm larger than the design storm requiring maintenance to replace the rock.	» Timber wave screens require maintenance over time to replace any broken whalers or fence boards. » A wave screen is best at attenuation when the height of the structure prevents overtopping of waves. » The structure may be severely damaged in a storm larger than the design storm requiring maintenance to replace the rock. » Timber wave screen with maintenance should last more than 20 years.
Timeline to Implement	» Much of the attenuator construction takes place at the manufacturer's plant. The dock sections will be transported by barge or truck to the site and floated into place. Onsite construction is estimated to be a month for the proposed attenuator layout.	» Rock is ordered once a contractor is given the NTP. Rock will be continuously trucked to the site while rock is actively being placed. Onsite construction is estimated between four to six months.	» The materials are shipped to site and then a template is set to help drive piles in the correct place. Piles are typically driven and then the fence is constructed. Onsite construction is estimated between two to three months.

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Difficulty of Permitting	» Lowest level of permitting obstacles/effort amongst the three options, since the supporting piles that would anchor the structure would result in minimal placement of fill/benthic disturbance. » The required alternatives analysis would not be complicated, as Options 2 and 3 would cause more disturbance and fill placement. » Some shading of the water column and benthic habitat would occur, but compensatory mitigation would not be required, so an extended permitting process and expenses involved with mitigation would be avoided. » No substantial obstacles anticipated for receiving a NYS Coastal Policy Consistency Determination from NYS Department of State.	» Highest level of permitting obstacles/effort among the three options, since a structure of this type represents permanent habitat conversion and loss of wetlands/waters of the U.S. due to placement of fill (12,264 SF footprint). » Approval would require a thorough alternatives analysis that demonstrates conclusively that there is no practicable alternative that would result in less loss of wetlands/waters, while still accomplishing the same goal (such as a wave attenuator). » Assuming a breakwater is ultimately approved by the USACE and NYSDEC, compensatory mitigation will be required, resulting in longer permitting process and significant costs. » Potentially inconsistent with some NYS Department of State Coastal Policies.	» This option represents a somewhat greater level of permitting obstacles/effort as compared to Option 1, but much less than Option 3, due to significantly lower levels of disturbance/habitat conversion/loss of wetlands. » The required alternatives analysis could easily be shown to result in less impacts than Option 2 and could be reasonably justified as being preferred over Option 1 by highlighting operational flaws/drawbacks of Option 1. » Most likely would not require compensatory mitigation and its associated permitting delays and costs. » No substantial obstacles anticipated for receiving a NYS Coastal Policy Consistency Determination from NYS Department of State.
Safety Measures	» Provides wave attenuation for marina. Will either require lighting or signage by USCG. » Navigation lights to be mounted six feet above the water level on signage, not to be mounted on piles » Mooring piles for ice sheets would be needed	» Provides wave attenuation for marina. Will either require lighting or signage by USCG. » Navigation lights to be mounted six feet above the water level on signage	» Provides wave attenuation for marina. Will either require lighting or signage by USCG. » Navigation lights to be mounted six feet above the water level on signage, not to be mounted on piles » Mooring piles for ice sheets would be needed
Aesthetics	» Lighting will be decided by the USCG and, if required, will be discussed during permitting. » Floating attenuator can be constructed of concrete or wood with aluminum. Piles will likely be steel pipe or concrete. » Concrete can be stained, or things can be added to the dock to make if match the surroundings (at a cost). » Anchor piles to be located every 20 feet. » Piles can be designed to match the surroundings (at a cost).	» Lighting will be decided by the USCG and, if required, will be discussed during permitting. » The breakwater will be constructed of a filter fabric with a marine mattress on the bay floor with armor stone stacked interlocking on top. The rock will either be granite or limestone if the rock can meet design requirements. » The rock structure aesthetics cannot be altered. » Piles needed for signage and lighting, if required.	» Lighting will be decided by the USCG and, if required, will be discussed during permitting. » The wave screen will likely be constructed of timber piles and whalers with either timber sheets or vinyl sheets. » The wave screen aesthetics come down to the timber or vinyl sheet choice. » Piles needed for signage and lighting, if required.
Ecological/Environmental Impact	» Minimal, non-significant benthic habitat loss due to pile installation. » Some shading impacts to water column and benthic habitats due to shadows cast by the attenuator floats. » If marina flora and fauna exist currently, they could attach to the submerged portion of the pile and dock. » The temporal and areal extent of temporary construction impacts (e.g., turbidity, noise, vibration, etc.) would be minor.	» Permanent loss of 12,264 SF of benthic habitat and added loss of water column habitat. » Would create rocky substrate habitat for marine flora and fauna (seaweeds, mussels, crabs, etc.) » The temporal and areal extent of temporary construction impacts (e.g., turbidity, noise, and vibration, etc.) to surrounding marine and shoreline habitats would significantly exceed those of Options 1 and 3.	» Minimal, non-significant benthic habitat loss due to pile installation. » Limited shading impacts to water column and benthic habitats. » The temporal and areal extent of temporary construction impacts (e.g., turbidity, noise, vibration, etc.) would be minor.
Social Impact	» Noise and vibration from piles being installed, either by vibrating a steel pipe into place or hammering a concrete pile into place. » Docks will be transported to the site by barge or truck and will be staged in the uplands until floated into place. Much less of a mess post construction for staging area. » Temporary road closures.	» Noise and vibration from the timber piles being hammered into place for navigation and safety. » Rock will be trucked to site, dumped on the ground, loaded on a barge, and then placed with an excavator. » Rock to be brought down from Hudson Valley, 160± truckloads through the community and need to be stored on site (potentially Osbourn Park)	» Noise and vibration from the timber piles being hammered into place. Typical construction tools will then be used to attached screen to pile.

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		» Increased potential for temporary road closures and road repairs.	
Transmission (Reduction of Wave Energy)	» Attenuator leaves gap below dock and bay floor and how well it attenuates is based on wave period (made for wind waves). The gap helps with basin circulation. Floating attenuators offer wave attenuation at a range of water levels.	» Rock breakwater extends from the bay floor and are required to be set at an elevation to prevent wave overtopping at a design storm interval. The effectiveness of a breakwater is dependent on water levels. » The structure touches the bottom of the bay floor and may hinder basin circulation depending on configuration.	» Wave fences are required to remain above the bay floor to allow passage of sea life. The effectiveness of the wave screen is based on freeboard of structure above water level. » The gap above the bay floor will aid in basin circulation.
Feasibility	All three options can be designed to be effective. Discussion with regulatory agencies will aid in structure type.		

[i]Cost data is based on local pricing at time of this document's preparation (November 2024) and is solely conceptual-level, not accounting for changes in market volatility, including but not limited to increases to raw material costs, supply chain costs, transport costs, inflation, labor rates, material availability costs, or material shortages. Cost data for options does not represent the entire cost of the project, which includes but is not limited to mobilization/demobilization, site preparation, demolition, utility/infrastructure, dredging, and marina facility repair/replacement work. The cost represented is solely an opinion of probable construction costs for all wave attenuation features presented as options 1 - 3. VHB makes no warranty, express or implied, that the bids or the negotiated cost of the Work will not vary from VHB's opinion of probable construction cost.