Application for Section 401 Water Quality Certification
Project: Shoreline Improvements at 31836 Lake Road, Avon Lake, Ohio
Applicant: John & Maria Marzavas
Site Address: 31836 Lake Road, Avon Lake, Ohio 44012
KS Project No: 13313

Item 5
Proposed Project Antidegradation Analysis

1. Project Description

a. Preferred Design Alternative: Construction of a new armor stone revetment with 4 to 6-ton armor stone placed at a 1.5 horizontal to 1 vertical slope to a crest elevation of 583.5 feet IGLD 1985. The toe of the structure will be placed a maximum of 51.6 feet from the existing toe of the shale bluff and will consist of 6-8 ton armor stone entrenched a minimum of 2 feet into shale bedrock. The revetment will be constructed lakeward of a new Redi-Rock retaining wall extending from the crest elevation of the revetment to an elevation of 609.0 feet IGLD 1985 near the top of the bluff. ODOT Type 57 gravel will be used as backfill between the existing shale bluff face and the new Redi-Rock retaining wall. The retaining wall will be anchored to the bluff face with #7 bars drilled and grouted a minimum of 3 feet into the shale bluff face. The retaining wall will include Redi-Rock access stairs leading to a 6-foot wide concrete cap extending approximately 28 feet along the crest of the revetment. The project will also include the placement of 126 cubic yards of sand prefill in the nearshore lakeward of the revetment.

This alternative meets the design objectives by providing protection to the eroding shale bluff from both wave based erosion and weathering. An armor stone revetment is typically the preferred method of shore protection along the shore of Lake Erie in the area of the project site as wave energy is dissipated along the rough angular slope of the structure. This is generally preferable over other alternatives, such as vertical seawall structures, that can reflect wave energy into the nearshore. The Redi-Rock retaining wall will also protect the upper portion of the bluff from weathering and will prevent eroded shale from piling on the concrete cap and crest of the revetment. This alternative also provides the property owners with safe access stairs and a lower platform to facilitate accessing the waters of Lake Erie.

Fill Materials: 640.7 cubic yards below Ordinary High Water including 173.2 cubic yards of armor stone (limestone), 214.2 cubic yards of concrete rubble and 253.3 cubic yards of concrete for the retaining wall and foundation. The project will also include the placement of 126 cubic yards of sand prefill below Ordinary High Water.

b. Minimum Degradation Alternative: Construction of approximately 106 linear feet of concrete module seawall and 20 linear feet of steel cribbing. The seawall will extend approximately 30 feet lakeward of the shale bluff with a cap elevation of 583.5 feet IGLD 1985. The seawall will be constructed with 7-foot long by 4-foot high by 3-foot wide pre-cast concrete modules filled with concrete and will be anchored with #7 bars drilled and grouted into shale bedrock at 3.5 feet on center. Cast concrete stairs and a lower concrete cap will be constructed at the lakeward end of the seawall at a cap elevation of 572 feet IGLD 1985 for launching small watercraft. The steel crib along the east face of the seawall will be framed with C8x13.75 channels at 16 inches on center and will be

anchored with W6x20 piles driven a minimum of 6 inches into shale bedrock through 8-inch by 8-inch by 5/16-inch thick steel tubes. ODOT Type "B" Stone will be used as crib fill. The seawall and steel crib will be capped with a 12-inch thick concrete slab reinforced with #5 bars at 12 inches on center in both directions. Concrete rubble and 3-foot by 3-foot by 3-foot pre-cast concrete blocks will be used as backfill landward of the seawall. The concrete blocks will support a Redi-Rock retaining wall and access stairs extending from the cap of the seawall to the top of the bluff at a maximum elevation of 609 feet IGLD 1985. ODOT Type 57 gravel will be used as backfill between the existing shale bluff face and the new Redi-Rock retaining wall. The retaining wall will be anchored to the bluff face with #7 bars drilled and grouted a minimum of 3 feet into the shale bluff face. The project will also include the placement of 126 cubic yards of sand prefill in the nearshore lakeward of the revetment.

This alternative meets the design objectives by providing protection to the eroding shale bluff from both wave based erosion and weathering. While not as effective at dissipating wave energy, the concrete block seawall in this alternative will not extend as far into the lake, will occupy a smaller are of lake bed and will require less fill to construct. Where wave reflection may be a concern (along the landward portion of the eastern face of the seawall) a steel crib has been included to absorb and dissipate wave energy. This alternative still supports a Redi-Rock retaining wall to protect the upper portion of the bluff from weathering and prevent eroded shale from piling on the concrete cap. This alternative also provides more direct access to the waters of Lake Erie and includes a steel davit and recessed area of the concrete cap for launching and retrieving small watercraft.

Fill Materials: 586 cubic yards below Ordinary High Water including 387 cubic yards of concrete, 167 cubic yards of concrete rubble and 32 cubic yards of ODOT Type "B" stone. The project will also include the placement of 126 cubic yards of sand prefill below Ordinary High Water.

c. Non-Degradation Alternative: The project would not be constructed leaving the existing shale bluff face vulnerable to erosion and preventing the property owners from accessing the waters of Lake Erie.

It is not practicable to construct a project to provide access to the waters of Lake Erie in a site with nearly vertical shale bluffs and to protect the bluffs from erosion without placing fill.

Fill Materials: 0 cubic yards below Ordinary High Water.

2. Avoidance

The design objectives of providing protection to the eroding shale bluff from both wave based erosion and weathering and providing access to the waters of Lake Erie could not be achieved

without a minimal effect on water resources. There is no feasible design alternative available for a re-design that will meet the project objectives and the project size could not be reduced and still provide protection to the entire length of the shore at the project site. No other sites were considered for this project as the project includes the installation of erosion protection on a specific property. Also, no other geographical areas were searched for alternative sites and no other non-wetland sites are available for proposed project.

The consequences of not constructing the project are that the shale bluff face would remain vulnerable to erosion and property owners would be prevented from accessing the waters of Lake Erie.

There are logistical concerns with the site. Because of the small width of the parcel and the location of the existing residential structures, all construction materials and equipment will need to be transported to the site by barge. This limitation is similar for the preferred and minimum degradation alternatives

3. Minimization

The design of the project was modified to minimize impacts to water resources at the site by the development of the Minimal Degradation Alternative as compared to the Preferred Alternative. The Minimal Degradation alternative includes a smaller footprint, does not extend as far into the lake and requires less fill for construction.

The footprint and lakeward extent of the structures proposed in the Minimal Degradation Alternative are the minimum practical considering the functional use of the space. The lakeward extent is determined by the space required for the access stairs. The upper access stairs have a minimum 12-inch tread widths and the width of the lower access stairs has been limited to 3 feet – 5 inches. The approximately 6-foot wide landing at the bottom of the main access stairs includes the width of the lower stairs.

4. Magnitude of the Proposed Lowering of Water Quality

There is no known medium or long term lowering of water quality due to the placement of the proposed materials into the waters of Lake Erie. There will be a temporary, short term, increase in turbidity levels during construction. There will also be an increase in fish habitat in the steel crib proposed in the Minimum Degradation Alternative.

5. Technical Feasibility and Cost Effectiveness

All three alternatives have been designed to be technically feasible and construction materials are readily available. However, the Non-Degradation Alternative would not produce the benefits of the project including: erosion protection, lake access, increased property values and tax revenues and Submerged Lands Lease fees.

Construction costs are estimated to be greatest for the Preferred Alternative and slightly reduced for the Minimum Degradation Alternative. The costs of the upper portions of the structure (Redi-Rock walls and access stairs) will be similar for each alternative. Costs are expected to be slightly lower for the Minimal Degradation Alternative due to the decrease in construction materials required. Accurate construction costs will not be available until contractor bids are received.

6. Economic Considerations

Construction of the Preferred or Minimal Degradation Alternatives will likely employ 4 to 6 workers for a period of about 2 months. This will provide a benefit to the local and regional economy. The local economy is in a state of recession recovery and would benefit from the proposed projects. The completed project will also increase the value of the project site and property tax revenue for the City of Avon Lake. The Submerged Lands Lease fees will also provide funding to be shared by the ODNR Office of Coastal Management and the City of Avon Lake. The Non-Degradation Alternative will result in no change.

7. Cumulative Impact

Both the Preferred and Minimal Degradation Alternatives include protection of the shore of a small parcel with only 63 linear feet of structure. Both the Preferred and Minimal Degradation Alternatives include the placement of 126 cubic yards of sand pre-fill to offset the long-term cumulative effects of armoring the shoreline of Lake Erie. Both alternatives have also been designed to intersect the structure on the western adjacent property to the greatest extent possible considering littoral rights partition lines. The Non-Degradation Alternative will result in no change.

8. Indirect Impacts

The Preferred and Minimal Degradation Alternatives are not expected to create a barrier to the movement of aquatic organisms, cause changes to drainage patterns, impact downstream water bodies, or cause measurable changes to the lakebed slope, cross section area or vegetation/surfacing. Indirect impacts of the project are expected to be minimal. The Non-Degradation Alternative will result in no change.

9. Construction Storm Water Management Plans

No water pollution controls are planned for either the Preferred if Minimal Degradation Alternatives since the fill materials do not pollute the water resource. Storm Water Pollution Prevention Plans are not required because of the small size of the project. The Non-Degradation Alternative will result in no change.

10. Post-Construction Storm Water Management Plans

The existing storm sewer at the east end of the project site will be extended behind the new Redi-Rock retaining wall and discharge through the proposed revetment or seawall in Preferred and

Application for Section 401 Water Quality Certification

Project: Shoreline Improvements at 31836 Lake Road, Avon Lake, Ohio
Applicant: John & Maria Marzavas
Site Address: 31836 Lake Road, Avon Lake, Ohio 44012
KS Project No: 13313

Minimal Degradation Alternatives. No other post-construction storm water impacts are expected. There will be no change in the Non-Degradation Alternative.