U.S. Fish and Wildlife Service
6669 Short Lane
Gloucester, Virginia 23061

December 17, 2007

United States Army Corps of Engineers
ATTN: CENAO-REG
803 Front Street
Norfolk, VA 23510

Re: NW 27 determination for Lake Tecumseh Wetlands Restoration Project

Dear Melissa,

Enclosed are supplemental materials to our December 14th, 2007 field reconnaissance that you requested. Please confirm this project may proceed under Nationwide Permit 27 Wetland Restoration.

Project Purpose:
Overall purpose is aquatic habitat restoration and enhancement. The project intends to improve water quality, reduce shoreline erosion, promote the establishment of emergent vegetation, and sustain existing forested wetlands by establishing minimum water levels in Lake Tecumseh. This will be achieved by constructing weirs (e.g. current deflectors) that will diminish water level fluctuations due to wind tides and prevent subsurface drainage of wetlands when tides recede. The project also seeks to manage public use of private and federal property by restricting access of motorized watercraft to Lake Tecumseh. Total size of Lake Tecumseh is 261 acres.

Prior to the creation of Asheville Bridge Creek by dredging through wetlands in 1968-69, Lake Tecumseh or Brinson's Inlet was principally an isolated, precipitation fed water body bordered by forested wetlands and an emergent *Peltandra* sp. dominated marsh to the south (Figure 1). After dredging, the lake and adjacent wetlands became subject to wind tidal flooding which effectively reversed the hydrologic cycle, draining the basin below wetland grade during the dormant cool growing season and flooding the basin during the warm growing season. With flood intervals of only a few hours between wet and dry, the basin's wetlands experience uncharacteristic flood stress (when compared to undisturbed non-wind tidal wetlands) year after year regardless of precipitation.

Perhaps the greatest stress is exerted upon forested wetlands in the basin. These wetlands are dependent on cycles of drought to expose soils and allow for seed germination and seedling establishment. Under the current wind tidal hydrologic regime, these forests are unable to regenerate because flooding occurs during the growing season year after year regardless of rainfall amount.

Water quality improvements will be achieved by reducing shoreline loss and promoting the establishment of emergent vegetation. Automatic water level monitoring at 3 hour intervals found drainage presently occurs at the greatest magnitude during winter months (Figure 2). It is thought this winter drawdown exposes soils to freezing and thawing which loosens soil particle cohesion. Subsequent wetting and drying from fluctuating water levels, along with wave action, causes erosion of shorelines and wasting of the spoil berms (Figures 3 and 4). This erosion creates turbidity which discharges directly to Back Bay estuary via Canal No. 1 (Asheville Bridge Creek). Frost exposure, coupled with dynamic water level changes, is thought to prevent the establishment of aquatic vegetation that would protect the shoreline and reduce currents that re-suspend sediment. By retaining waters in the lake below elevation 2.2, we expect to achieve some reduction in turbidity and promote establishment of emergent vegetation by reducing water level flucuations. During higher flows, waters would be redirected through adjacent wetlands which is expected to provide additional water quality improvement through reductions in flow velocities.

The overall result of introducing wind tide influence to previously hydrologically isolated wetlands is degradation of forested wetlands, erosion induced turbidity, potential sulfuric soils (Lee Daniels per. Com.), and the potential conversion of forested wetlands to emergent marsh. The weirs will establish minimum water levels on Lake Tecumseh preventing the lake from draining completely and will reduce water level fluctuations due to wind tides by 54% (Figure 5). Other than plugging Canal No. 1, total exclusion of wind tides from the lake is not possible due to the low grades of surrounding wetlands. However, it is possible to force tidal flow through wetlands adjacent to Lake Tecumseh before they enter or exit the lake effectively slowing the rate of tidal exchange.

Project Description:

The project involves the construction of two vinyl sheet pile weirs, a berm rehabilitation, and shoreline reconstruction (Figure 6). All work will occur between Lake Tecumseh and Canal No. 1 (Ashville Bridge Creek) in Virginia Beach, Virginia.

The primary weir will be placed at existing wetland grade (elev. 2.2) across a human-made channel 40 feet in width (Figure 4). A secondary weir of approximately 1000 linear feet will be placed at an identical grade to the first weir along the western shore of the lake and through a dredged area inside a forested wetland. The existing spoil berm separating the lake from the canal will be cleared of trees, regraded to elevation 4.0, and planted in native grasses.

Approximately 250 linear feet of eroded shoreline on the north side of the berm will be reconstructed to extend out 25 feet from the existing toe of slope. The new shoreline will be graded to an elevation matching nearby forested wetlands. The constructed shoreline will be supported at the waters edge by bio-engineering materials (biologs) and live stakes, and will be revegetated with a native mix of wetland grasses and shrubs.

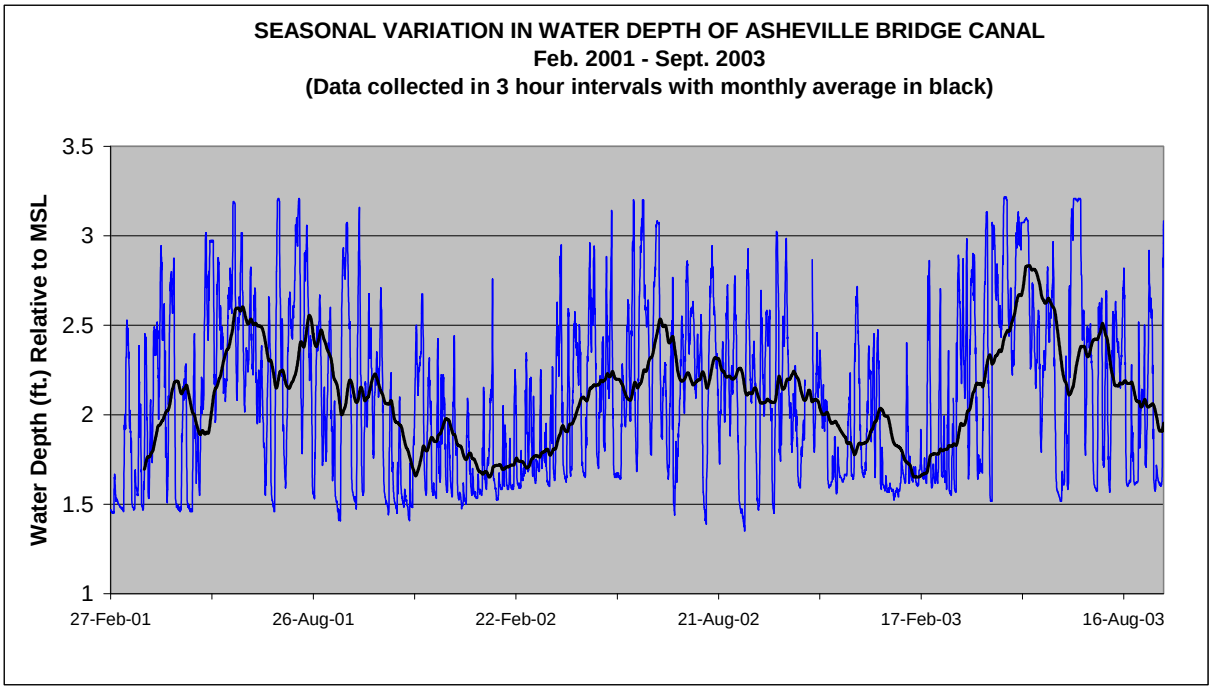

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Figure 1. Wind tides drain wetlands in the winter and flood wetlands in the summer as shown in the monthly average trend (black line) of this data from Asheville Bridge canal. This is in opposition of the natural trend of isolated, precipitation based wetlands where drought cycles expose soils for seed germination and permit forests to regenerate.

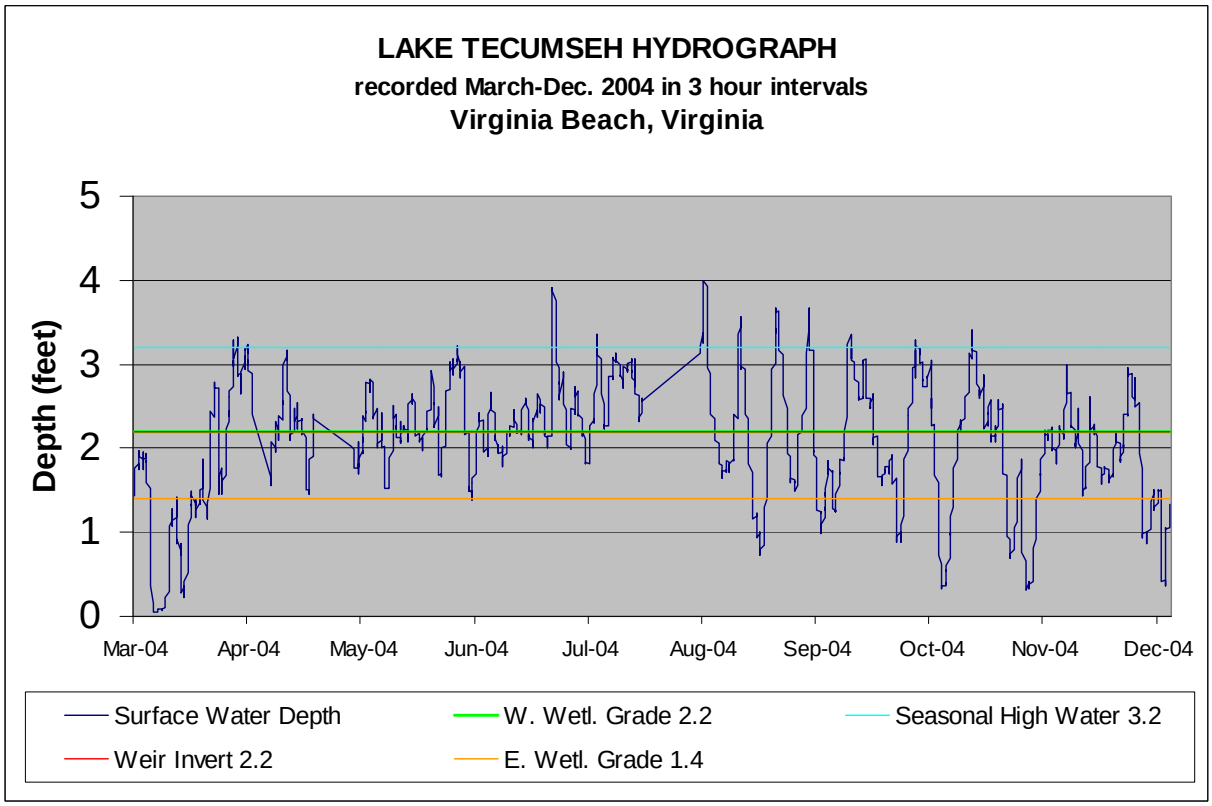


Figure 2. The project will reduce wind tidal fluctuations by 54% and prevent subsurface draining of wetlands associated with Lake Tecumseh.

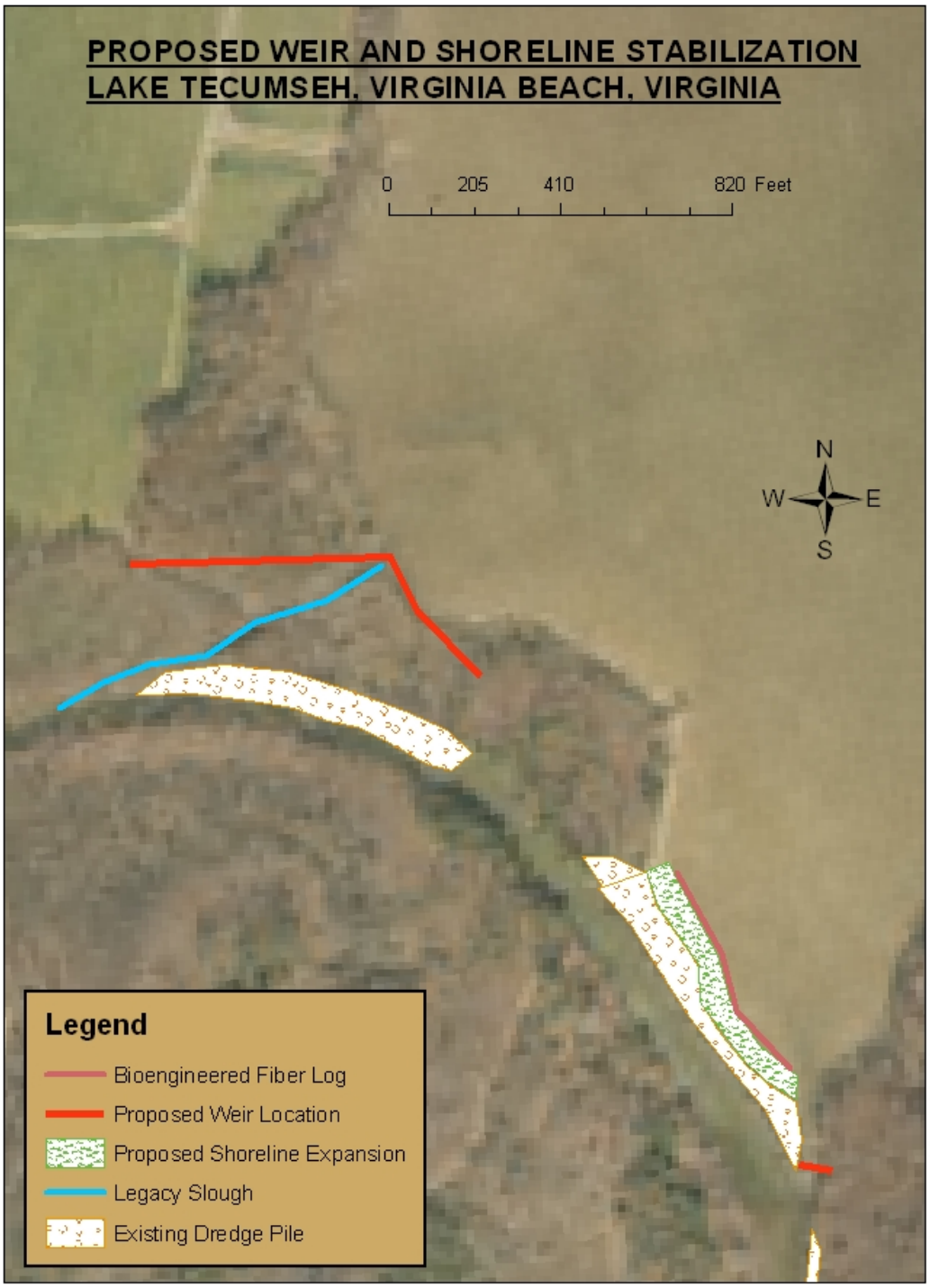


Figure 3. Proposed Restoration Plan for Lake Tecumseh

Alternatives:
The elevation of the primary weir was originally proposed at 2.6 NGVD but was lowered to 2.2 at the request of HRSD engineers who were concerned about flooding about the outfalls of the Atlantic Treatment Plant expansion. Those outfalls are set at 2.5 NGVD.

The option of floating the excavator to the site on a barge was abandoned because of potential risks and logistical difficulties. To avoid damage to tree roots in the forested wetland, the alignment of the secondary weir will follow a dredge line through the forest that does not contain trees.

Equipment and materials access:
A track excavator will access the site of the primary weir by crossing wetlands south of the HRSD fields on wooden mats. On occasion, downed trees composed of red maple locally obtained will be utilized to maintain ground pressure at less than 5 psi. The crossing will be made between trees to reduce wetland disturbance and will occur only once (e.g. once in and once out). Vinyl sheeting, fuel, biologs, matting and other materials will be brought in to the site by boat or ATV with trailer.

Minimization of wetland impacts:
No loss of wetlands from filling is anticipated.

Property Ownership:
The weirs will be constructed on property owned by the U.S. Department of the Interior (Service) and the Hampton Roads Sanitation District (HRSD). HRSD has signed an agreement with the Service for the construction and maintenance of the project. Lake Tecumseh is owned entirely by HRSD with shoreline ownership shared between HRSD, the U.S. Navy, and the U.S. Fish and Wildlife Service. The U.S. Navy has signed a letter in support of the project.

Notice to Mariners:
A reflective warning sign measuring two feet high will be mounted on posts across the weir at a minimum height of two feet above the final grade.

Potential for Flooding Adjacent Lands:
A 2005 study by the U.S. Geological Survey using existing stormwater models for the City of Virginia Beach determined existing flood elevations in the affected area of the project would not increase with the addition of the weir due to substantial storage capacity provided by Lake Tecumseh.

Applicability to Nationwide 27 permit:

Please contact me if you have any questions or comments at 804-693-6694 ext. 124.

Sincerely,

Will Smith, Program Biologist

cc: USFWS, Virginia Beach, VA (Jared Brandwein)
CORPS, Norfolk, VA (Melissa Nash)
VDEQ, Virginia Beach, VA (Bert Parolari)

Supplemental Materials

Figure 4. Shoreline erosion in the lake creates turbidity that degrades water quality. Freeze and thaw exposure loosens soil particles and promotes soil loss. A project goal is to reduce erosion by minimizing tidal fluctuations and promoting the establishment of emergent vegetation.

Figure 5. Dynamic water level fluctuations driven by wind tides cause rapid draining of Lake Tecumseh and associated wetlands, especially during the winter. Exposure to cold during these events creates undue stress upon aquatic dependent organisms and forests when compared to similar undisturbed wetland complexes.

Figure 6. This canal, measuring 40 feet wide and 8 feet deep, between Lake Tecumseh and Asheville Bridge Canal is the site of the proposed primary weir.

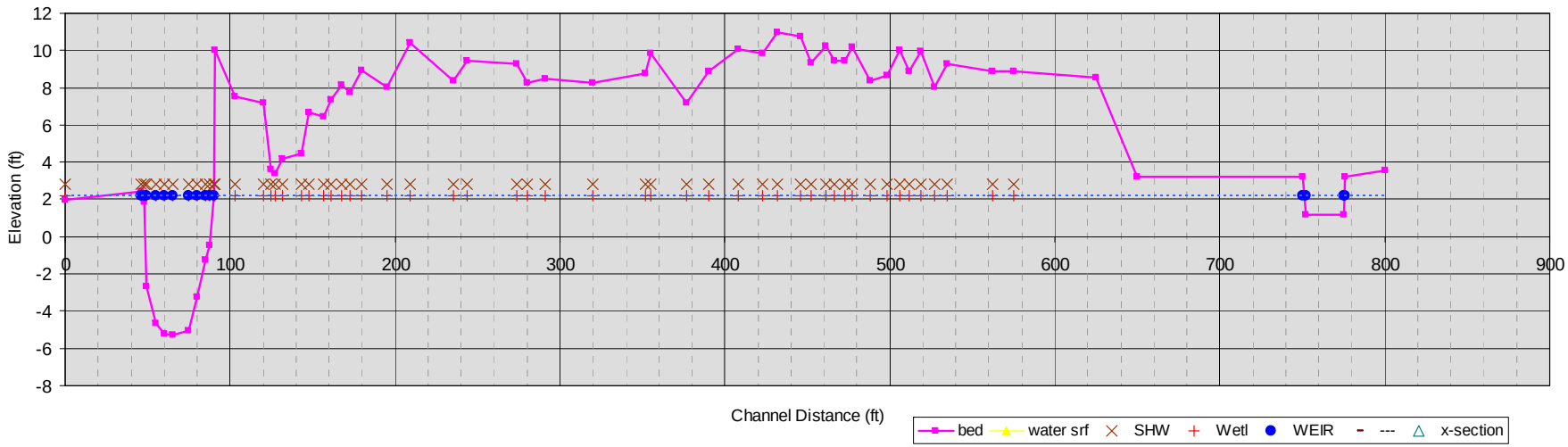
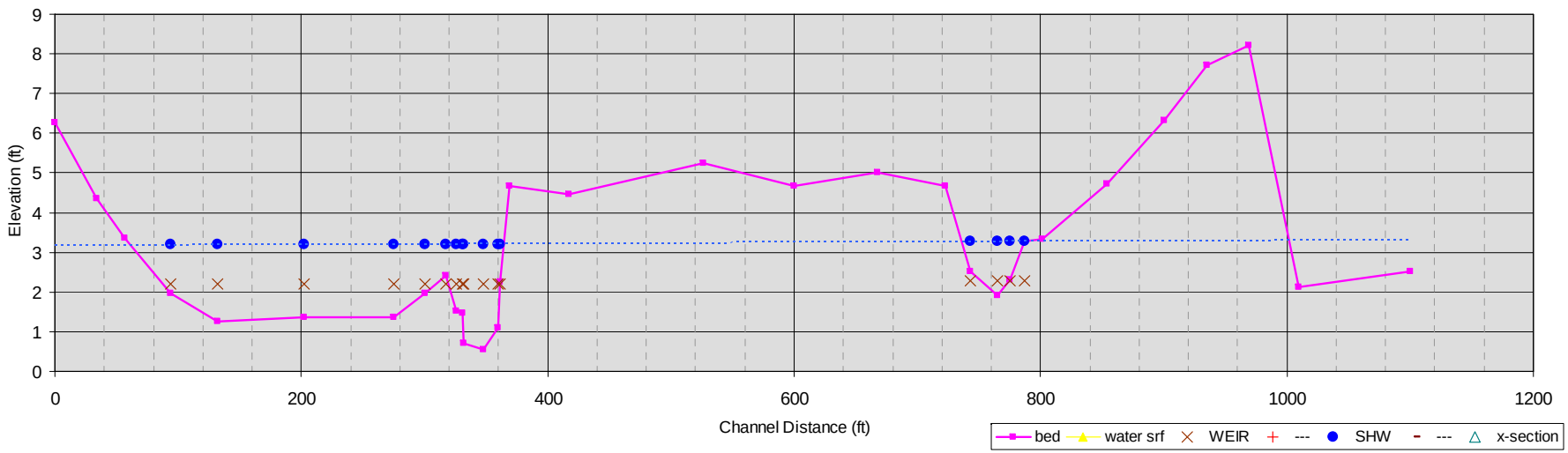
Figure 7. Site of proposed shoreline construction and berm rehabilitation.

Figure 8 Erosion on the north face of the berm between the lake and the canal threaten to breach the berm unless preventative measures are taken.

Figure 9. This marsh located just south of Lake Tecumseh was isolated from wind tides in 2000. Emergent vegetation flourished during the drought of 2007 when water levels were able to recede, exposing soils and allowing seed germination. Wetlands under tidal influence at this time where otherwise inundated continuously. (photo taken August 2007)

LONGITUNDINAL SURVEY PLOTS

Lake Tecumseh Primary Weir Site Existing Berm Profile



Profile of Wetlands and Berm South of HRSD Fields