ALTERNATIVES EVALUATION FOR DMUs 9 & 10 MARINE MATTRESS BUFFALO RIVER AREA OF CONCERN

Prepared for

Buffalo River Project Coordination Team

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July 2014

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1 INTRODUCTION

At the specific request by the New York State Department of Environmental Conservation (NYSDEC), Anchor QEA, LLC (Anchor QEA) has prepared this evaluation of alternatives for DMUs 9 & 10, that are undergoing remediation under the Great Lakes Legacy Act project for the Buffalo River Area of Concern (AOC). This evaluation looks at remedial alternatives for residual sediment post environmental dredging at the base of the marine mattress area off of the Buffalo Color Area A. The Buffalo Color Area A is one of 20 critical structures identified along the Buffalo River. The alternatives presented are based on existing information collected as part of the upland Area A remediation, performed by South Buffalo Development under the New York State Brownfield Program as well as in-river data collected for the AOC.

2 BACKGROUND

The brownfield remediation efforts associated with the upland e Buffalo Color site were completed in December 2013. The Brownfield cleanup work included building and structure demolition, groundwater cut-off wall construction, a groundwater pump and treatment system, soil cap and cover installations, and shoreline restoration. The shoreline plantings were recently installed in 2014. In 2006, a protective armored shoreline cover was installed along a 200-foot section of shoreline comprised of a series of anchored marine mattresses providing containment and erosion protection along the shoreline. Since their installation, the mattresses have been observed by the property owner to be stable and protective of the shoreline. Mattress sections were comprised of geo-composite grids filled with armor stone, anchored at top of slope and extending into the Buffalo River. Most recently, in early 2014, shoreline restoration (including additional planting soil and plantings) was implemented along the Area A riverbank portion of the site as part of the larger restoration effort for the full Area A shoreline portion of the property.

During the remedial design for the Buffalo River AOC, the Area A property was identified as a Critical Structure due to the cut-off wall that is a critical element of the upland remedy. As a Critical Structure, additional evaluation of the effects of dredging in front of the structure was completed to determine any potential detrimental effects from the dredging project. Removal of material in front of various segments of the Area A property was evaluated

through the combined efforts of Anchor QEA, AMEC, McMahon & Mann Consulting Engineers, as well as other consultants in the past. During the review, shoreline segments upstream of the marine mattress were noted to be in stable condition with little effect from sediment removal in river due to the anticipated (and now completed) shoreline restoration which incorporated removal of shoreline features and laying back shoreline slopes. Evaluation of the marine mattress segment indicated the slope is currently in stable condition, but the removal of sediments from the base of slope has the potential to impact the global stability factor of safety.

To support evaluation of the slope stability, additional investigations were performed to evaluate underlying soil/sediment conditions and determine the as-built locations of the marine mattress segments. In-water borings were collected at the approximate toe of the marine mattress slope in 2013, with 3 borings advanced to 20+ feet. In April of 2014, an updated multibeam survey was performed to confirm existing bathymetry in the vicinity to inform the analysis. At the time of surveying, additional sediment probing was completed to determine the actual as-built location of the toe of the marine mattresses to confirm previous diver investigations performed in 2013. The combined data from these extensive investigations have been considered in the following evaluations of alternatives for the dredging in DMUs 9 and 10.

As part of the Buffalo River Area of Concern Remediation Project a total of approximately 37,000 cubic yards of sediment are targeted for removal from DMUs 9 and 10, representing a fraction of the overall remedial dredging operations which currently targets approximately half a million cubic yards of sediment.

3 OBJECTIVES

This evaluation of alternatives has the following primary objective:

- Identify and screen potential options for removal or management of the residual targeted sediment located in front of the marine mattress in DMUs 9 & 10.

Based on prior investigations and analyses, and previous discussions with New York State Department of Environmental Conservation (NYSDEC), the following alternatives are being evaluated:

- Alternative 1: Natural Recovery (dredging offset to center of channel)
- Alternative 2: In-Situ Capping
- Alternative 3a: Dredging proposed prism (10 ft offset, 3:1 slope)
- Alternative 3b: Dredging proposed prism with post-dredging sand cover
- Alternative 4a: Dredging up to toe of marine mattress
- Alternative 4b: Dredging up to toe followed by backfilling
- Alternative 5: Marine Mattress removal, slope layback, and full dredging

4 ALTERNATIVES

The following sections outline each alternative and provide a summary of screening considering effectiveness, implementability, and relative cost.

4.1 Alternative 1: Natural Recovery

Incorporated as a standard baseline case for comparison, Alternative 1 would utilize natural recovery as a method of managing operations in the area. The natural recovery option utilizes a dredging offset from the marine mattress. Consistent with the approach utilized elsewhere as part of the GLLA remedy, this offset would restrict dredging to the center of the navigation channel adjacent to the marine mattress. Monitoring of the sediments would be included through the established Year 2 and Year 5 monitoring plans for the river, as well as the Engineering and Institutional Controls established in the monitoring plans. Future options would include the potential for enhanced natural recovery based on the approach for meeting Year 5 goals outlined in the monitoring plans.

4.1.1 Effectiveness

This alternative would have no change in sediment conditions at the toe of the marine mattress. In-situ sediments would be left in place for engineering and institutional control management compared to other alternatives. As no action would be taken during remediation, no hazards associated with the work would occur.

4.1.2 Implementability

As no action would occur as part of this alternative, this is readily implementable.

4.1.3 Cost

As no action would occur, costs associated with this alternative are minimal. Costs associated with monitoring and controls are equivalent to those necessary for other alternatives and future work associated with the main river remedy.

4.1.4 Screening Result

Alternative 1 is removed from consideration due to the failure to attempt to address the impacted sediments located in DMUs 9 and 10, effectively increasing the material left in place compared to other alternatives.

4.2 Alternative 2: In-Situ Capping

This alternative would utilize an armored cap installation to protect sediments left in place. Similar to the application utilized in the City Ship Canal in front of the ADM/Pillsbury property, an armored cap would be installed over sediments adjacent to the marine mattress to protect against erosion of the material. A single or double layer cap would be utilized and armor stone sized based on expected shear stress in the region as calculated by previous hydrodynamic modeling.

Based on limited boat traffic in the immediate area, it is assumed that armor stone sizing would be primarily driven by flow induced shear stress – further evaluation would determine prop wash and boat wake effects on armor sizing. Evaluations would also determine the need for a filter layer based on the calculated armor stone size and the underlying sediment size – if armor stone is sufficiently small, only a single layer installation would be required. Armoring extents would be expected across a footprint sufficient to protect the upland slope, similar in sizing to the footprint described further in Alternatives 3a and 3b.

Given the proximity of the toe of the marine mattress to the navigation channel, coordination with the USACE and approval to place capping materials within the federal

navigation channel footprint and within authorized depths would be required for this option. Due to the permanent nature of this installation, a modification to the federal navigation channel restricting dredging would also be necessary for future protection of the cap.

4.2.1 Effectiveness

This alternative would reduce surface sediment exposure concentrations at the toe of the marine mattress by creating a clean sediment surface overlying the targeted sediment. Existing targeted sediments would remain in place though potential exposure would be removed and the sediments would be contained in place through erosion protection and armoring. Additional monitoring and potential for maintenance would be required with the installation of a cap.

4.2.2 Implementability

As in-situ capping is currently being utilized as a management method in the City Ship Canal as part of the remediation project, this alternative is readily implementable, pending necessary permitting. Sourcing of potentially different armor stone would be required, as well as coordination with the dredging contractor regarding placement.

4.2.3 Relative Cost

It is assumed that the increased cost for cap materials and placement would be comparable to the cost reduction associated with the reduced dredging in this area. Additional costs associated with long term monitoring and maintenance would be incurred and are assumed to be comparable to the ADM/Pillsbury cap.

4.2.4 Screening Result

Alternative 2 is not considered viable. Though readily implementable and utilized elsewhere as part of the remediation project, this alternative presents logistical issues associated with placement of capping materials within a federal navigation channel and within federal authorized depths, requiring changes to allowable dredging within the federal channel for long term protection.

4.3 Alternative 3a: Dredging Proposed Prism

This alternative would incorporate the removal of 97% of the targeted sediments within DMUs 9 and 10, leaving approximately 1, 300 cy of sediment as support for the slope. The proposed prism is based on an updated marine mattress toe alignment, a 10 foot offset, and a 3H:1V slope to protect the marine mattress and upland slope stability from an overly large vertical cut at the base of slope. The 10 foot offset has been established to protect the installed marine mattress from damage during dredging operations.

Recent surveying has illustrated a varying toe due to differing marine mattress panel segments, and observable horizontal accuracy of the ongoing dredging efforts precludes a tight tolerance for dredging adjacent to this structure. Following the offset, an industry standard 3H:1V slope will be utilized down to the proposed design till elevation.

Monitoring of the sediments would be included through the established Year 2 and Year 5 monitoring plans for the river, as well as the Engineering and Institutional Controls established in the monitoring plans. Future options would include the potential for enhanced natural recovery based on the approach for meeting Year 5 goals outlined in the monitoring plans.

This approach is similar to that approved and used in locations where Critical Structures owners did not accept the liability release and elected for no dredging – such as the General Mills property along the City Ship Canal which left ~8,000 cubic yards in place due to structural concerns.

4.3.1 Effectiveness

The dredging included as part of this alternative would remove the vast majority of targeted sediment from the DMUs, leaving a de minimus quantity of material necessary to ensure the bank remains stable. The use of an offset from the marine mattress is based on standard industry practice and reduces the risk of damage to the mattress during construction; furthermore, the combined offset and slope reduce risks associated with the global stability of the slope.

Use of a narrower 5 foot offset was reviewed but was not considered adequately protective due to the irregularity of the marine mattress toe, and the greater risk of shoreline failure if the marine mattress is impacted during construction. Additionally, due to the configuration of the slopes and the location of the mattress toe in proximity to the navigational channel, the 10 foot offset results in a similar quantity of material left in place (approximately 1,300 cy) compared to the 5 foot offset while providing much greater protection for the marine mattress. This alternative utilizes an approach consistent with all structures and many shorelines from the approved final remedy. Any and all structures associated with the remedial dredging receive, at minimum, a 5 foot offset. A 10 foot offset is utilized for dredging at shorelines that include natural and stone sloped, grouted slope, cobble, gravel, and debris, riprap, and sloped stone gabion shorelines as well.

The proposed work is consistent with the approved approach for dredging adjacent to structures or shorelines that could be impacted by dredging. This approach is similar to previously approved methods for other Critical Structures.

4.3.2 Implementability

As dredging would proceed with only a revised dredging template, this approach is readily implementable. However, this approach requires careful observation and supervision of the dredge operator during implementation and when in proximity of DMUs 9 and 10.

4.3.3 Relative Cost

Costs would include the general dredging operations costs for removal, transport and disposal at the USACE Confined Disposal Facility (CDF). Minor costs would also include those associated with monitoring and controls, equivalent to those necessary for other alternatives and future work associated with the main river remedy.

4.3.4 Screening Result

Alternative 3a is retained. Readily implementable along the existing project schedule, this option follows the approved final design elements for other structures and shoreline types and leaves a minimal quantity of material in place, similar to shoreline locations along many other stretches of the river. This approach removes the risk associated with operations or

removal at the immediate toe of the marine mattress and reduces risk for the upland remedy as well. Material will be sampled for confirmation as part of an agreed upon sampling plan to determine the condition of the sediments to be left in place.

4.4 Alternative 3b: Dredging Proposed Prism with Post-Dredging Sand Cover

This alternative proceeds in the same manner as Alternative 3a with the addition of post-dredging sand cover. As the proposed offset and slope may leave sediments in place that have been targeted for removal, this option will provide cover material to promote system recovery within the benthic zone, reducing the availability of contaminants within the sediments left in place. This approach is similar to the accepted approach for enhanced natural recovery outlined in the Year 2 and Year 5 monitoring plans, where added material will be placed to reach the remedial goals for surface concentrations.

4.4.1 Effectiveness

Similarly to the results of Alternative 3a, the dredging included with this option removes the majority of targeted sediment from DMUs 9 and 10 while protecting the toe of slope of the marine mattresses. The addition of clean backfill placement further reduces the exposure of any remaining targeted sediments.

4.4.2 Implementability

Dredging implementability is the same as described for Alternative 3a, in Section 4.3.2. Application of a sand cover following dredging would require sourcing of an acceptable sand material and coordination with the existing dredging contractor for placement and verification. As the targeted material that would remain in place extends into the navigation channel, coordination with the USACE and approval to place material within the federal navigation channel footprint and within authorized depths would be required for this option. The sand cover material associated with this alternative is assumed to be for general reestablishment and would not require changes to the federal navigation channel or authorized depths, only coordination and permission for installation.

4.4.3 Relative Cost

Costs would include the general dredging operations costs for removal, transport and disposal at the USACE Confined Disposal Facility (CDF). Additional costs would be associated with the purchase and placement of sand, including potential remobilization costs and/or schedule delay costs associated with the added work.

4.4.4 Screening Result

Alternative 3b is retained. Though additional coordination would be required to source material and determine placement requirements, additional protection of the sediments to remain in place reduces risk associated with exposure. Coordination and permitting efforts for placement within the navigation channel may limit application of the alternative within the given construction schedule.

4.5 Alternative 4a: Dredging to Toe of Marine Mattress

This alternative would incorporate dredging the full quantity of targeted sediments within DMUs 9 and 10 immediately adjacent to the toe of the marine mattress. No offset would be utilized from the structure, contrary to the approach utilized for the remainder of the remediation project and at other similar projects, nationally, where offsets are used to protect sensitive structures or shoreline features. No backfill or other shoring materials would be utilized post-dredging. To conform to previous evaluations of slope stability, overdredge allowances restrictions would be necessary adjacent to the structure, limited to the original design allowance of 6 inches.

4.5.1 Effectiveness

This alternative would remove all targeted sediments as part of the remedial dredging if till elevations are as established in the final design. However, potential exists for the till to be at different elevations (either higher or lower), changing the targeted removal quantity. Though all sediments would be removed, potential exists to destabilize the existing marine mattress slope due to the removal of ~5-10 feet of sediment from the toe of slope, which will reduce the existing factor of safety of the slope.

If triggered, such processes have the potential to extend upland far enough to impact the installed cut-off wall (slag cement/bentonite wall) from the upland remedy. Given the irregular shape of the toe of mattress due to the individual panels, as well as the horizontal accuracy shown in the ongoing dredging, potential to damage the existing mattress segments during dredging also exists, potentially losing the erosion protection on the slope. Coordination with the property owner would be necessary and the owner would have to agree to accept this liability.

4.5.2 Implementability

As dredging would proceed with only a revised dredging template associated with the overdredge allowance, this approach is readily implementable.

4.5.3 Relative Cost

Costs would include the general dredging operations costs for removal, transport and disposal at the USACE Confined Disposal Facility (CDF), including the additional material removed up to the toe of the mattress. Minor costs would also include those associated with monitoring and controls, equivalent to those necessary for other alternatives and future work associated with the main river remedy.

4.5.4 Screening Result

Alternative 4a is removed from consideration due to increased and unacceptable levels of risk associated with the removal of material from the toe of slope. The removal of the sediments at the toe of slope could reduce the existing factor of safety of the slope, putting the marine mattress and shoreline geotechnical stability at risk of failure. This could also impact the upland remedy through potential damage to the installed cut-off wall. Dredging immediately adjacent to the marine mattresses could also lead to damage to the mattresses themselves, impacting the protection provided by the mattresses. Even after dredging is complete, the large open cut face would remain susceptible to erosion, potentially undermining the existing marine mattresses over time.

4.6 Alternative 4b: Dredging to Toe Followed by Backfilling

This alternative proceeds in a similar manner as Alternative 4a with the addition of backfilling following dredging to provide a buttress along the toe of the marine mattress. Under this alternative, backfill (sand or gravel) would be placed at a 3H:1V slope from the toe of the marine mattress to shore up the slope and limit the potential for erosion of the cut face.

Dredging operations would be restricted to 'slot' dredging, proceeding with a limited length of shoreline prior to stopping removal operations and switching to backfilling operations. This would limit the time the larger open face cut would be exposed and reduce the impact to the overall slope stability prior to the placement of the backfill. While this method would increase the factor of safety over an open cut, a decrease in the existing factor of safety would still occur following excavation and backfill.

Given the proximity of the toe of the marine mattress to the navigation channel, coordination with the USACE and approval to place materials within the federal navigation channel footprint and within authorized depths would be required for this option. Due to the permanent nature of this installation for long term slope stability, a modification to the federal navigation channel restricting dredging may also be necessary for future protection of the slope.

4.6.1 Effectiveness

This alternative would remove all targeted sediments as part of the remedial dredging assuming that the till elevations are located as established in the final design. However, potential exists for the till to be at different elevations (either higher or lower), changing the targeted removal quantity. Though the post-backfill factor of safety would show an improvement over the open cut case, the existing factor of safety of the slope cannot be re-achieved under this scenario.

Considering the variance in strengths of underlying materials and the range of possible existing conditions cases, risk still exists for destabilizing the slope during dredging and backfilling operations, or under a longer term scenario. Coordination with the property owner would be necessary and the owner would have to agree to accept this liability.

Ongoing monitoring and maintenance of this buttress will be necessary to ensure the slope remains stable, and observation following navigation dredging events may be necessary.

4.6.2 Implementability

Dredging in 'slots' as described has been utilized on other projects to limit impacts to adjacent slopes or structures. Dredging in this fashion will see slower production rates as the limited length is dredged then operations switching to backfill. Operations in this critical structure area, with restricted dredging and necessary observation, would likely be required in daytime operations only, adding to overall implementation schedule as 24 hour operations would not allowed. Surveying and verification of removal will need to be coordinated to ensure targeted material is removed to design grades.

4.6.3 Relative Cost

Several added expenses will be incurred through the use of this method. Reduced dredging production rates are to be expected, increasing schedule and potentially impacting the overall project schedule as the project attempts to complete in 2014. Added costs for backfill purchase and placement will also be incurred. In addition to production and added materials costs, increased surveying requirements will add costs to this method. Frequent surveying to verify removal and backfill in multiple segments with quick turnaround times will be necessary as part of this operation, increasing associated costs for the work.

4.6.4 Screening Result

Alternative 4b is retained as an option pending logistical issues associated with placement of capping materials within a federal navigation channel and within federal authorized depths. However, the permitting process related to this option will be significant, if at all a permit could be obtained as this will require placement of a fill in navigable waters of the U.S., and particularly in an active navigation channel. Additionally, it would be necessary to get the property owner's consent to accept the increased liability associated with this option.

4.7 Alternative 5: Marine Mattress Removal, Slope Layback, and Full Dredging

This alternative would incorporate removal of the previously installed marine mattress segments, removal of upland materials to reduce the steepness of the slope, and full dredging of targeted sediments from the final design. This option is being considered as a bookend to the no action alternative but through the course of the project, Honeywell has indicated that it would not support removal of the mattresses.

Removal of the marine mattresses would incorporate removal of the approved and recently implemented Brownfield shoreline restoration work overlying the mattresses (including shoreline protection, added soil, and plantings), excavation and removal of the soil anchors installed to support the mattress segments, removal of the previously installed inclinometers used to monitor the slope, removal and dismantling of the mattresses, and removal of upland soil to contour the slope to reduce overburden stresses on the global slope stability. Following slope contouring, shoreline protection and additional restoration would be required to replace the removed work required as part of the upland remediation settlement. Once mattress removal and slope contouring is completed, full dredging of targeted sediments in DMUs 9 and 10 would occur.

4.7.1 Effectiveness

This alternative would remove all targeted sediments as part of the remedial dredging should till elevations be located as established in the final design. Potential exists to locate till at different elevations (either higher or lower), changing the targeted removal quantity. As the slope would be reworked as part of this alternative, no structural support at the toe would be required assuming a sufficiently stable factor of safety could be achieved given the configuration of the removal (with potential additional overdredge), and location of upland features such as the installed cut-off wall.

Short term risks associated with this alternative include potential impacts to the upland cut-off wall through the slope reconfiguration and anchor removal. Coordination with the property owner would be necessary and the owner would have to agree to accept this liability.

4.7.2 Implementability

Removal of the marine mattress and associated appurtenances presents a challenge to cleanly remove, dismantle, and reconfigure the slope while both protecting the slope stability and the completed upland remedy including the adjacent cut-off wall. Slope reconfiguration operations have the potential to expose materials currently protected by the marine mattress.

Removal of anchors and other portions of the mattress, as well as slope reconfiguration work, have the potential to negatively impact the installed cut-off wall during the rework. Efforts as part of this alternative would also remove recently installed Brownfield restoration elements and require replacement following the work. Dredging would proceed as in other locations with additional attention to the slope, and potential restriction to overdredge based on the final slope configuration.

4.7.3 Relative Cost

Removal of the marine mattresses, management of the slope and soils, replacement of restoration elements, and full dredging would be the highest cost alternative for the small additional removal quantity compared to other alternatives. In addition to general construction costs, added costs would be seen through schedule impacts to the dredging operations – design of the mattress removal, slope reconfiguration and associated slope stability analyses, and all necessary permitting and agency coordination would set back dredging beyond the anticipated removal date, incurring at minimum additional remobilization costs and potentially pushing implementation out of the current dredging season.

4.7.4 Screening Result

Alternative 5 is removed from consideration due to potential impacts to the established upland remedy, and unacceptable risks to the upland containment system and upland soils associated with the removal of the mattresses, and all sediment beneath the mattresses. . Removal of the mattress to access dredge material beneath the mattress and to avoid the need for an offset or other in-place approaches discussed above provides a minimal positive impact on long term risk reductions, but greatly increases short term risks. Any potentially impacted material in the slope is currently protected in place by the established marine mattresses. Though the additional river sediment removal would incrementally reduce

exposure risk in the river, potential for risk associated with the upland remedy reduces the overall benefits of this alternative such that it has been removed from consideration.

5 SCREENING SUMMARY AND OTHER CONSIDERATIONS

A summary of the screening results are provided below.

Table 1

Screening Summary

Alternative	Description	Retained or Removed	Reasoning
1	Natural Recovery - Dredging Offset to Center of Channel	Removed	Failure to address impacted sediments, increases material left in place compared to other alternatives
2	In-Situ Capping	Removed	Logistical issues associated with placement of in-situ capping materials in federal channel; required changes to federal channel restricting dredging
3a	Dredging Proposed Prism - 10 foot offset, 3H:1V slope	Retained and Selected	Readily implementable within current project schedule; follows approved final design elements for other critical structures and shorelines; removes risk associated with slope stability
3b	Dredging Proposed Prism with Post Dredging Sand Cover	Retained	Added cover of sediments/residuals reduces risk of exposure beyond that of Alternative 3a; permitting implications remain associated with materials placed in federal channel
4a	Dredging Up to Toe of Marine Mattress	Removed	Reduces factor of safety of slope; unacceptable increase in risk due to potential for damage to existing marine mattress protection
4b	Dredging Up to Toe Followed by Backfilling	Retained, Pending Evaluation	Introduces greater risk for reduced slope stability and damage to existing marine mattress; logistical issues associated with placement of materials in federal channel; required changes to federal channel restricting dredging
5	Marine Mattress Removal, Slope Layback, and Full Dredging	Removed	Potential for impacts to installed upland remedy; unacceptable increase in risk due to removal of installed shoreline stability elements; removes shoreline restoration elements

5.1 Coordination with Ongoing River Dredging

Given the timing of dredging operations on the Buffalo River and the desire to remove as much impacted sediment from DMUs 9 and 10 as possible in the interim while alternatives and future work is negotiated with NYSDEC, dredging operations are proceeding with Alternative 3a at this time. CH2M Hill (CH2) and Ecology and Environment (E&E) have been provided the updated marine mattress toe information and recommended offset and slope information and will generate a revised dredge prism for DMUs 9 and 10.

Dredging will proceed with the proposed offset and slopes, and a post-dredge survey and sampling approach will be utilized to check sediments that may remain in place following the proposed dredging operations. South Buffalo Development, the owner of the upland property, will monitor the previously installed inclinometers during the dredging activities to observe the condition of the slope during the work.

5.2 Future Monitoring and Follow-up Actions

Following discussion with NYSDEC on the proposed alternatives and path forward, it was requested that this document also outline approaches based on post-dredge sampling results following implementation of Alternative 3a. A combined investigation will be performed following dredging comprised of multi-beam survey and analytical testing of the sediments. Surveying will determine the volume of material left in place based on the original estimated till elevation from the CH2 and E&E final design removal template. As stated previously, this volume assumes that till elevations follow the original template, though ongoing dredging operations in 2013 and 2014 have shown extensive variation in the actual versus design elevations of till.

Analytical sampling will be finalized in a separate sampling plan. Sampling will evaluate sediments at the toe of the marine mattress in DMUs 9 and 10 and compare to the established remedial goals for the Buffalo River Remediation project. Sampling will test for the four indicator Contaminants of Concern (COCs), including total PAHs, total PCBs, lead, and mercury. Specifics of the sample collection will be determined in the sampling plan but are anticipated to focus on the stable surface sediments. Depending on the results of the sampling, potential actions could include:

- No further action if levels of COCs are sufficiently low;
- Placing suitable material (such as sand, beneficial reuse sediment, or other approved materials) to achieve compliance with remedial goals where samples show surface sediment concentrations are unacceptable, or
- Pending permitting approval for permanent materials installed within the navigation channel, potential options include installation of an isolation cap to provide long term environmental protectiveness by isolating the existing sediments from the environment, or additional dredging with supporting backfill should stability evaluations show sufficient factor of safety is retained.