CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: September 4, 2024 FILE REF: 11-16-591466

TO: Remedial Design Team for the C Street Slip GLLA Project c/o:
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FROM: Erin Endsley and Joe Graham (DNR)

SUBJECT: Post-Dredge Confirmation Sampling Requirements for the C Street Slip

The purpose of this memo is to make recommendations and establish the minimum requirements for the post-dredge confirmation sampling program for the remediation of contaminated sediments in the C Street Slip, BRRTS #s 11-16-591466 and 02-16-275446 (the site). During July and August 2024, the DNR proposed and discussed confirmation sampling requirements with the project team, received written and verbal input from Foth on behalf of SWL&P, and considered this input when describing the requirements below. The items outlined here are expected to be incorporated into the remedial design to facilitate authorization of the remedy under DNR regulatory permits, satisfy relevant requirements under Wis Admin Code chs NR 700 to NR 799, and attain our shared goal of completing a sediment remedy at the site with no or minimal long-term obligations at project closeout or case closure[1].

<u>Post-Dredge Confirmation Sampling – Remedial Footprint Areas:</u>

1. The RAOR[2] for impacted sediments at the site established two parent DMUs[3] for the remedial footprint areas: MGP DMU and Mercury DMU (Figure 1).
2. Each parent DMU shall be divided into sub-DMUs, each approximately 10,000 ft^2 in size (actual sub-DMU sizes may vary), resulting in a minimum of four sub-DMUs for MGP DMU and six DMUs for Mercury DMU (Table 1). Figure 1 shows a conceptual layout using the minimum number of sub-DMUs with individual sub-DMUs ranging in size from about 9,000 to 25,000 ft^2.
3. Each sub-DMU shall be further subdivided into a minimum of eight decision units for the purpose of collecting confirmation samples (approx. sample density of one sample per 1,705 ft^2), which will result in at least 80 total discrete sample locations (see Table 1). The size, shape, and orientation of individual decision units should be consistent but may vary within or between sub-DMUs. The delineation of decision units shall consider the geometry of the dredge footprint, higher/lower concentration areas, sloping areas, and other factors as appropriate. DNR must approve the layout of decision units/sample locations prior to the collection of confirmation samples. DNR approval will be given by email or verbally to the PCT[4] and Government.

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[1] For this memo project closeout is assumed to be completion of the final accounting by EPA under the GLLA project agreement and case closure is under Wis Admin Code ch. NR 726.

[2] Remedial Action Options Report (RAOR), C Street Slip, Foth, March 2024

[3] Dredge Management Unit (DMU)

[4] Project coordination team (PCT) means the representative(s) from SWL&P, DNR, and EPA under the GLLA project agreement or their designated alternates.

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4. A minimum of eight confirmation core samples shall be taken from each sub-DMU. Analytical results will be compared to the NTE[5] decision level and used to calculate a SWAC[6], which will then be compared to another decision level to determine if remediation goals are met or if additional dredging is needed on a decision unit, sub-DMU, parent DMU, or alternate basis.
5. NTE and SWAC decision levels for COCs[7] are given in Table 2. Null areas outside the remedial footprint, i.e., the parent DMUs, shall be excluded from SWAC calculations for parent DMUs and sub-DMUs. If samples are collected in null areas for other purposes, a SWAC value may also be calculated for the total slip area for informational purposes. The PCT, with DNR approval, may waive the NTE level for mercury results in sub-DMU HG-A where model predicted concentrations at specific locations of the dredge cut line may exceed the NTE level or other cleanup endpoints in consideration of shoreline stability concerns for additional dredging.
6. Confirmation sampling shall only be done after the target elevations have been achieved and accepted based on acceptance criteria identified in the contract specifications. DNR suggests that the specifications require that the contractor achieve dredge target elevations in more than 90% of each sub-DMU area and that no contiguous high spot is equal to or greater than six inches above the target elevation. The specs should also include provisions to limit effort and stop dredging where high subgrade (i.e., dense native red clay) is encountered above the dredge target elevation.
7. The design should specify a minimum time delay after dredge completion and/or a minimum distance from active dredging, material offload, or sediment cover operations that must be attained prior to confirmation sampling. This requirement may be reevaluated based on the contractor's proposed approach, satisfactory demonstration of their overall performance, and effective implementation of BMPs[8] for dredging, material handling, resuspension controls, and DNR approval of any proposed deviations.
8. Sediment cores shall be advanced to obtain at least 18 inches of sediment recovery, with a target recovery of at least 75% determined as 100 times the measured thickness of sediment recovered divided by the recorded depth of penetration below the sediment surface. If no core achieves 75% recovery, the best recovery of three attempts may be processed for sampling. The contractor shall use core tubes that are longer than 18 inches.
9. One sediment core sample a minimum 18 inches in length shall be collected and processed from locations agreed upon by the PCT and approved by DNR from each decision unit.
10. Discrete samples shall be collected and analyzed from the 0.0-0.5 foot interval, 0.5-1.0 foot interval, and the 1.0-1.5 foot interval below the sediment surface at each core location. The shared goal of not having long-term obligations requires that the bottom sample of each confirmation core location yields analytical results below decision levels. Samples may need to be collected where impacted soft sediment may remain deeper than the 1.0-1.5 foot interval, and the design should consider identifying target elevation ranges for each sub-DMU or decision unit.

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[5] Not to Exceed (NTE)

[6] Surface Weighted Average Concentration (SWAC)

[7] Contaminant of Concern (COC)

[8] Best Management Practices (BMPs)

11. Consider using the presence of a dense native red clay bottom interval as a performance standard – boundary for dredge completion. In this event, the specifications must clearly define dense native red clay and include provisions for Government/PCT concurrence. We suggest that design documents include a representative photo(s) of dense native red clay along with a narrative definition and that a qualified individual(s) provide oversight during core processing to confirm the contractor's interpretation of dense native red clay.
12. Prior to the Government's direction to the construction contractor, the PCT members will review sample results and, under consensus by the PCT with extra weight given to DNR's position for its regulatory authority role, identify and confirm post-dredge decisions based on confirmation sample results. The PCT may utilize adaptive management for decision-making and may designate alternate areas for SWAC calculation, subject to DNR approval.
13. At a minimum, the contractor shall provide a map of locations sampled, field logs, table of sample coordinates, water elevation, sediment surface elevation, core tube length, measured penetration, measured recovery, percent recovery, core logs including USCS[9] profile descriptions, elevations, observations of NAPL or chemical sheen or odors when collecting or processing samples, and detailed photographs for each interval sampled with legible views of the tape measure and whiteboard containing sample collection information. Raw laboratory results must be provided in well-bookmarked and indexed pdf[10] format(s). Analytical results shall also be provided in a Microsoft Excel file format that identifies any results above decision levels in Table 2, shows field and laboratory IDs, laboratory qualifiers, all calculations (e.g., SWAC and Total PAH), and anything else identified by the Government, PCT, or DNR.
14. A Post-Dredge Confirmation Sampling decision tree incorporating these requirements is attached (Figure 2). Additional dredging passes, with a minimum cut depth of at least 0.5 feet, shall be made per the decision tree. The Government shall direct the contractor on the locations, areas, cut depths, and estimated volumes for additional dredge passes only after consultation with and concurrence by the PCT and DNR. Additional confirmation samples shall be collected after each dredging pass directed by the Government and compared to the cleanup goals. No more than one re-dredge pass should be anticipated prior to placement of a sediment cover for residuals management in any area. However, where field and analytical results indicate outlier conditions additional dredging or other action may be warranted to meet the cleanup goals for protection of human health and the environment as well as minimizing long-term obligations. The Government shall consult the PCT and DNR in the event extreme conditions are encountered prior to deciding or directing the construction contractor on dredge completion. A change order should be expected to be executed expeditiously and without delay for any material to be removed beyond the first re-dredge pass.
15. For the engineers cost estimate and bidding purposes, we recommend including a separate, optional line item, for re-dredging passes to achieve the clean-up goals (CUG) in Table 2. The allocation of risk for dredged residuals in the 0-0.5 ft sample interval should be 100% on the contractor, while allocation of risk for any un-dredged inventory (i.e., deeper intervals beyond assumed dredge prism) should be on the Government/PCT based on the sediment investigation and prism design.

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[9] Unified Soil Classification System (USCS)

[10] Portable document format (pdf)

Performance Verification Sampling – Null Areas (optional per PCT direction):

16. Null areas are outside the identified remedial footprint areas with COCs above PRGs (i.e., dredge prisms) and shall not be used for post-dredge confirmation sampling decisions (SWAC).
17. Post-dredge confirmation sampling is not needed to confirm the presence/absence of un-dredged inventory in null areas. However, sampling of the null areas could be used to assess contractor performance, post-dredge residuals in null areas from resuspension during dredging operations, and remedy effectiveness over the entire slip area.
18. Sampling of null areas may not be required based on contractor performance if adequate dredging, material handling, and resuspension control BMPs are utilized and maintained to be effective and minimize the resuspension or redeposition of contaminated sediment during construction.
19. Performance verification sampling in null areas should be considered based on the selected contractor, their history and success in meeting conditions of state water quality certifications or permits, their performance, and any unforeseen events during construction, such as severe weather or equipment failure with the potential for redistributing contamination outside the remedial footprint.
20. If sampling of null areas is included for performance verification, the sampling strategy is to collect one surface grab sample per 5,000 ft^2 in null areas post-construction; cores are not needed. This would result in approximately 22 additional samples based on the assumed dimensions in Table 3.
21. Sampling in null areas can also be considered if a metric is desired for evaluating the overall effectiveness of the remedy. In this event the performance verification (approx. 22 null area samples) and post-dredge confirmation samples (at least 80 DMU samples) could be used to calculate a SWAC for the total slip-project area. Alternatively, additional samples could be collected after placement of sand for a sediment cover from a grid pattern at a rate of one grab per 5,000 ft^2 over the total slip area to evaluate the net effectiveness of the remedy (about 49 samples spread over entire slip).

Table 1 Confirmation Sampling Areas, Purpose, sub-DMUs, and Number of Cores (Decision Units)

Subarea	Description	Purpose	Area (ft^2)	Acres	Min # sub-DMUs	Min # Cores (Decision Units)
MGP DMU	Parent DMU for MGP. Single area from EVS Model & design with MGP impacts	Verify achievement of cleanup goals in DMU and each sub-unit	51,354	1.18	4	32
Hg DMU	Parent DMU for mercury. Two distinct areas with mercury above PRGs	Verify achievement of cleanup goals in DMU and each sub-unit	85,061	1.95	6	48
ALL DMU	Sum of MGP & Hg DMUs	Same as above for each parent DMU	136,415	3.13	10	80
Total Slip	Approximate area of the entire slip including parent DMUs and Null Areas	Included for gauging relative size of cleanup areas to the footprint of the entire slip	243,961	5.60	NA	NA

Table 2 Post-Dredge Confirmation Sampling Decision Levels (Clean-Up Goals)

Contaminant of Concern (COC) [1]	**SWAC** [2] **(mg/kg)**	**NTE (mg/kg)**	**Other**
Total PAH18 [3]	12.2 (PRG-MEC)	22.8 (PEC)	NAPL is not present [4]
Mercury [5]	0.59 (PRG-BTV)	0.87 (Midpoint between MEC and PEC)	
Benzo(a)pyrene [6]	Calculate Value Only	21.1 (10 x IND DC RCL)	

[1] - The RAOR identified Total PAH18, Mercury, Benzo(a)pyrene, and Arsenic as COCs and established numeric preliminary remediation goals (PRGs) for these compounds, which were used to delineate the remedial footprint necessary to meet the remedial action objectives (RAO). Benzo(a)pyrene and arsenic were included to address dredging restrictions under RAO 3, that is, "*Minimize to acceptable levels or eliminate the degree and extent of contaminants of concern (COCs) from controllable sources in the C Street Slip that necessitate special handling procedures during dredging or dredged material disposal*." To simplify monitoring and decision-making during construction, the DNR will not require confirmation sampling for arsenic here, given the limited extent of locations within the footprint above the 16 mg/kg (2xbackground) threshold DNR considered for the arsenic NTE level at this site.

[2] – Null areas shall not be included in SWAC calculation for post-dredge confirmation sample decision making.

[3] - Total PAH18 to include the sum of detections for 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(e)pyrene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene.

[4] – Non-aqueous phase liquid (NAPL) is defined for this site as coal tar or petroleum hydrocarbons sorbed to the sediment or held in pore space between sediments, which could become mobilized or released into the water column during or after dredging operations and can be readily identified visually or olfactorily by qualified and knowledgeable individuals.

[5] – In consideration of shoreline stability or other relevant factors, the PCT may waive the mercury NTE level and apply adaptive management and adjust the decision levels and post-dredge actions for mercury results in sub-DMU HG-A.

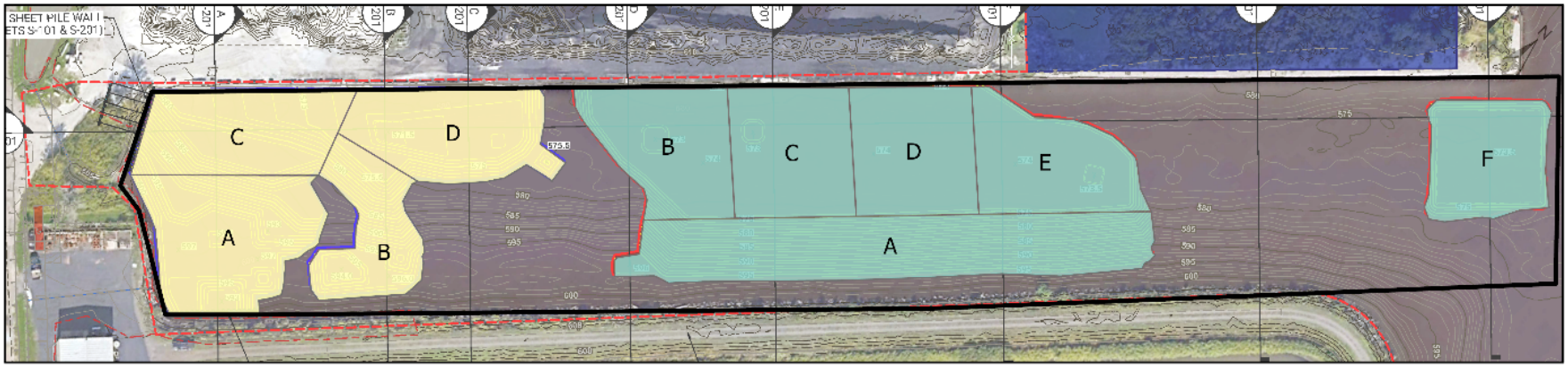
[6] – DNR considered including a benzo(a)pyrene (BaP) SWAC of < 2.11 mg/kg for post-dredge decision-making based on Wisconsin's non-industrial direct contact residual contamination level. However, after further consideration, the DNR believes the BaP SWAC should not be used as a primary decision criterion for the site but should instead be made available and considered by the PCT and DNR as a line of evidence in decision-making under an adaptive management approach. The BaP SWAC will be calculated by the contractor and compared to the IND DC RCL as a metric for the overall effectiveness of the remedy for informational purposes.

PRG – Preliminary Remediation Goal
MEC - Midpoint Effects Concentration
PEC – Probable Effects Concentration
BTV – Background Threshold Value
IND DC RCL – Industrial Direct Contact Residual Contamination Level

Table 3 Performance Verification Sampling – Null Areas

Subarea	Description	Purpose	Area (ft^2)	Acres	Sampling Rate
Null Area	Areas in slip that are outside locations with COCs above PRGs (i.e., dredge prisms or remedial footprint)	Verify contractor performance for handling and containing contaminated sediment or overall remedy effectiveness. Excluded from SWAC calculation for parent or sub-DMUs	107,546	2.47	1 grab sample per 5,000 ft^2; use grid spacing
Total Slip	Approximate area of the entire slip including parent DMUs and Null Areas	Included for gauging the relative size of null areas to the entire slip	243,961	5.60	Same as above when collected after sand placement

Figure 1 Delineation of Parent DMUs and Conceptual Layout for Minimum Number of Sub-DMUs



Legend

C Street Slip

DMU Delineation

Parent_DMU

HG

MGP

Sub-DMU

Labeled A to F

0 50 100 200 Feet

WISCONSIN DEPT. OF NATURAL RESOURCES

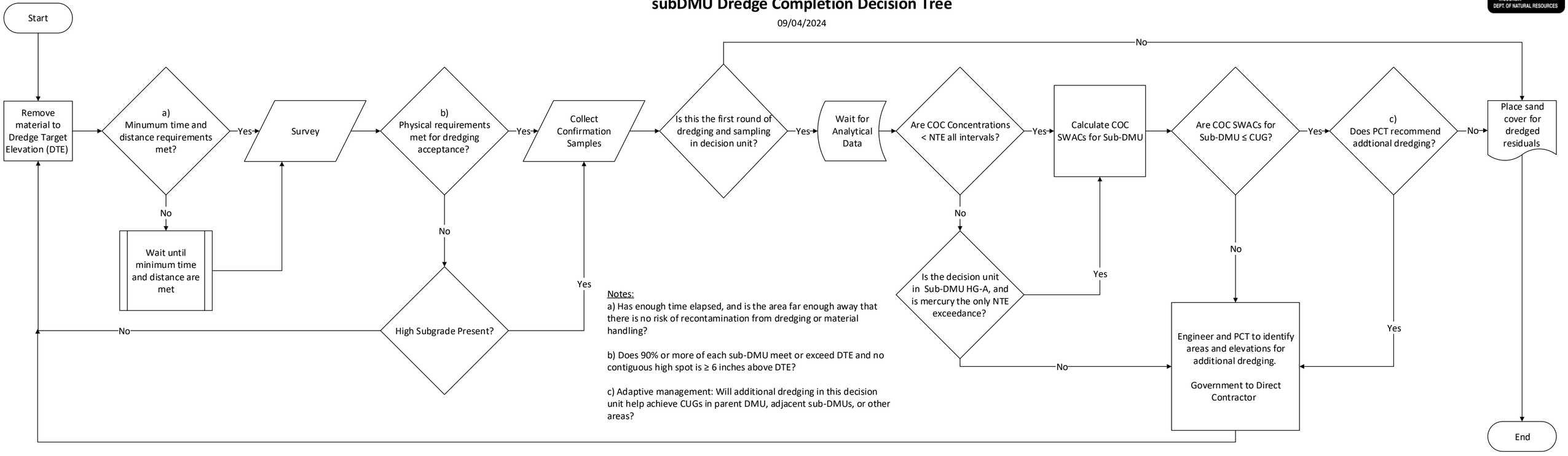
Proposed naming convention: Parent DMU - Sub-DMU - Decision Unit/Core# (1 to 8 not shown)

Example: HG-A-1 is the label for a core sample taken from from decision unit/core 1 in mercury DMU sub-DMU A

Conceptual sub-DMU delineation prepared August 28, 2024 using Foth dredge plan sheet c-104 , July 31, 2024

C Street Slip GLLA Project
subDMU Dredge Completion Decision Tree

09/04/2024



Notes:

a) Has enough time elapsed, and is the area far enough away that there is no risk of recontamination from dredging or material handling?

b) Does 90% or more of each sub-DMU meet or exceed DTE and no contiguous high spot is ≥ 6 inches above DTE?

c) Adaptive management: Will additional dredging in this decision unit help achieve CUGs in parent DMU, adjacent sub-DMUs, or other areas?