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August 26, 2021

VIA EMAIL AND PRIVATE CARRIER

Gary Schold, Project Manager
Land Restoration Program
Land and Materials Administration
Maryland Department of the Environment
1800 Washington Boulevard, Suite 625
Baltimore, Maryland 21230

Subject: Transmittal of Bulkhead Granular Fill Replenishment Report
Lockheed Martin Corporation – Middle River Complex
2323 Eastern Boulevard, Middle River, Baltimore County, Maryland

Dear Mr. Schold,

For your information, please find enclosed two hard copies of the subject report. This report summarizes the granular fill replenishment for the Blocks F and D bulkheads at the Middle River Complex in Middle River, Maryland.

Please let me know if you have any questions. My office phone is (301) 548-2209.

Sincerely,

A handwritten signature in blue ink, appearing to read "Tom D. Blackman", with a long horizontal flourish extending to the right.

Thomas D. Blackman
Project Lead, Environmental Remediation

cc: (via email without enclosure)
Mark Mank, MDE
Christine Kline, Lockheed Martin
Mary Morningstar, Lockheed Martin
Tom Green, LMCPI
James Damm, LMCPI
Michael Martin, Tetra Tech
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cc: (via Box)
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Rina Scales, LMCPI

cc: (via mail with enclosure)
Budd Zahn, MRAS

**BULKHEAD GRANULAR FILL
REPLENISHMENT REPORT
LOCKHEED MARTIN MIDDLE RIVER COMPLEX
2323 EASTERN BOULEVARD
MIDDLE RIVER, MARYLAND**

Prepared for:
Lockheed Martin Corporation

Prepared by:
Tetra Tech, Inc.

August 2021

Revision: 0



Michael Martin, P.G.
Regional Manager



Joshua Mullis
Project Manager

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ACRONYMS AND ABBREVIATIONS

Elite	Elite Environmental
Lockheed Martin	Lockheed Martin Corporation
MRC	Middle River Complex
Tetra Tech	Tetra Tech, Inc.

SECTION 1 INTRODUCTION

On behalf of Lockheed Martin Corporation (Lockheed Martin), Tetra Tech, Inc., (Tetra Tech) has prepared this *Bulkhead Granular Fill Replenishment Report*. This report summarizes the granular fill replenishment for the Blocks F and D bulkheads at the Middle River Complex (MRC) in Middle River, Maryland (Figure 1-1). This report documents the placement and compaction of granular fill between the newer steel sheet piling and the older concrete capped portions of the bulkheads to bring the edge to grade, as well as the replacement of the missing cover plates over the lifting holes in the sheet piling.

1.1 BACKGROUND

A new concrete cap was installed over the granular backfill in Block F as part of season one construction of the sediment remedy, as described in the *Bulkhead Soil Retention Dark Head Cove Design* (Tetra Tech, 2016). However, portions of the cap subsided after installation, and the concrete cap was later removed and replaced with additional granular fill. The concrete cap was not placed in Block D and (due to the subsidence experienced in Block F) granular stone fill was used to bring it to grade with the existing bulkhead.

This report documents activities performed to replenish the granular fill lost to settlement/erosion. The work was completed per the *Bulkhead Outfall Sealing Work Plan* (Tetra Tech, 2020). Field reconnaissance indicated that the stone backfill placed during bulkhead restoration in Blocks D and F ranged from maintaining grade to settling up to 12 inches in some portions of the bulkheads. Several metal plates used to cover the lifting holes in Block D sheet piles were also noted as missing and in need of replacement.

SECTION 2

GRANULAR FILL REPLENISHMENT

Replenishment of the granular fill behind the bulkhead walls was conducted on May 6 and 7, 2021. The work was performed by Elite Environmental (Elite) with a representative from Tetra Tech serving as oversight and the health and safety lead. All work was documented in Daily Activities Reports, included as Appendix A. Elite used a skid steer with a flat bucket attachment to move granular fill from an existing stockpile in Block F to the areas along the bulkhead walls where granular fill had been lost or settled over time. In areas not accessible to the mini-excavator, bulk granular fill was transferred from the skid steer into wheelbarrows and then placed along the bulkhead.

Shovels and hand rakes were used to fill in all voids along the bulkheads and bring the level of granular fill up to match the existing grade of the bulkhead caps and sheet pile walls. After replacing fill to grade, a plate tamper was used to compact the granular fill. A push broom was used to clean spilled material on the bulkhead cap, which was swept into settlement areas. Care was taken to avoid spilling granular fill into Dark Head Cove when placing, grading, compacting, and cleaning it off the concrete portion of the bulkhead. Areas receiving granular fill are shown on Figure 1-1.

Before the granular fill was replenished along the bulkhead in Block D, Elite replaced several missing plates used to cover the lifting holes in the sheet piles. Elite cut approximately six-inch by six-inch sheets of tin and secured them over the exposed lifting holes using epoxy. The epoxy was allowed to set for approximately 24 hours before the granular fill was placed in these areas.

SECTION 3

SUMMARY AND PLANNED MONITORING

This section summarizes granular fill replenishment and future monitoring requirements. Granular fill was replenished to grade along the entire length of the bulkhead walls in Blocks D and F using a mini excavator, wheelbarrows, and hand tools. A plate tamper was used to compact the granular fill, and the metal plates covering the lifting holes in the sheet piles in the Block D bulkhead were replaced prior to replenishing fill to prevent the further loss of granular fill along the bulkhead. One more round of bulkhead inspection will be completed. Tetra Tech will perform the monitoring inspection, will document the condition of the bulkheads and any settlement or loss of the granular fill in a bulkhead inspection field report, and will provide copies of the report and recommended corrective actions to Lockheed Martin. Following this final round of bulkhead inspection, monitoring and maintenance of the bulkheads will be turned over to LMC Properties, Inc.

SECTION 4 REFERENCES

Tetra Tech, Inc. (Tetra Tech), 2016. *Bulkhead Soil Retention Dark Head Cove Design, Lockheed Martin Middle River Complex, 2323 Eastern Boulevard Middle River, Maryland.*

Prepared by Tetra Tech, Inc., Germantown, Maryland for Lockheed Martin Corporation, Bethesda, Maryland. August.

Tetra Tech, Inc. (Tetra Tech), 2020. *Bulkhead Outfall Sealing Work Plan, Middle River Complex, 2323 Eastern Boulevard Middle River, Maryland.* Prepared by Tetra Tech, Inc.,

Germantown, Maryland for Lockheed Martin Corporation, Bethesda, Maryland. February.

FIGURES

Figure 1-1 Site Layout, Tax Blocks and Location of Concrete Bulkheads at Dark Head Cove

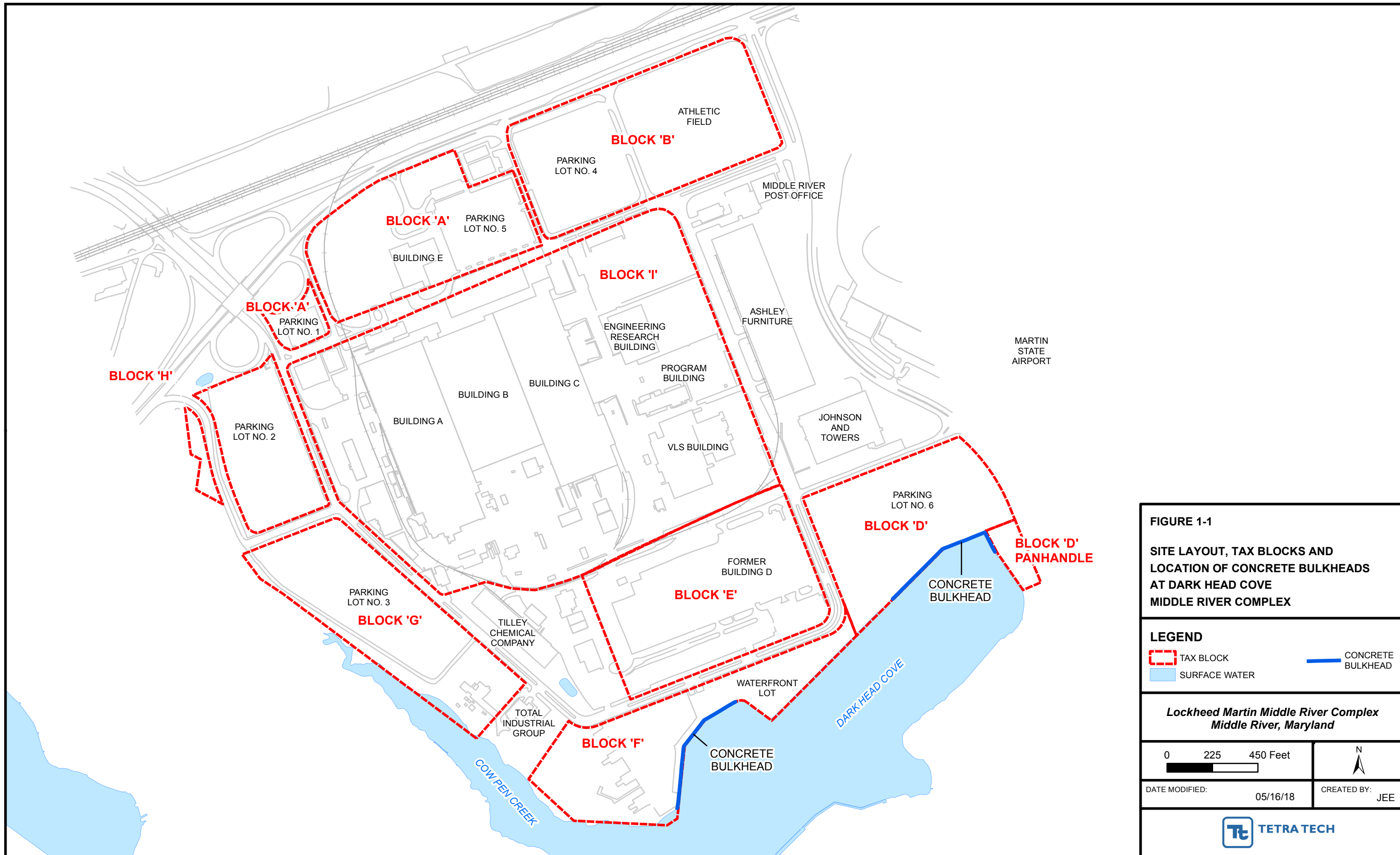







FIGURE 1-1
SITE LAYOUT, TAX BLOCKS AND
LOCATION OF CONCRETE BULKHEADS
AT DARK HEAD COVE
MIDDLE RIVER COMPLEX

LEGEND

 TAX BLOCK	 CONCRETE BULKHEAD
 SURFACE WATER	

Lockheed Martin Middle River Complex
Middle River, Maryland

0 225 450 Feet	
DATE MODIFIED: 05/16/18	CREATED BY: JEE

 **TETRA TECH**

APPENDICES

Appendix A—Daily Activities Reports



TETRA TECH, INC.

**DAILY ACTIVITIES REPORT
BULKHEAD STONE REPLACEMENT
LOCKHEED MARTIN, MIDDLE RIVER, MD**

Duration of Site Activities

Report #:

Date:

On-Site:

Off-Site:

Superintendent :

AM Weather:

PM Weather:

Tailgate Health & Safety Topic Discussed

Summary of Work/Major Activities Completed Today

Inspections Completed Today

Delays/Problems Encountered Today

Planned Week Schedule

Proposed Schedule for Next Week

Comments:

Comments:

Comments:

Comments:



TETRA TECH, INC.

**DAILY ACTIVITIES REPORT
BULKHEAD STONE REPLACEMENT
LOCKHEED MARTIN, MIDDLE RIVER, MD**

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Comments:

