

Chesapeake Bay TMDL

Action Plan

Phase 3

Prepared for Fort Monroe Authority, Virginia

11/15/2024



This document is being used to identify the strategies that Fort Monroe is using to reduce nutrient and sediment contributions to the Chesapeake Bay.

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Executive Summary

Fort Monroe's progress towards the Chesapeake Bay TMDL requirements is explained in the following Chesapeake Bay TMDL Action Plan (the Action Plan). Calculations of the reduction of pollutants are also stated to accurately describe the obligations that Fort Monroe will meet to reduce Chesapeake Bay TMDL for current projects. Future projects will be planned to follow this plan according to the future foreseeable outcomes that these projects are projected to have. The numbered sections under the Action Plan Elements correspond with the numbered sections in Part VI of the Department of Environmental Quality (DEQ) Chesapeake Bay TMDL Special Condition Guidance document and are relied upon by Fort Monroe in developing and maintaining this plan.

This document has been updated as of September 2023 to reflect changes made to the ownership at Fort Monroe. Additionally, it has been updated to contain proposed projects to meet the 100% pollutant reductions required during the upcoming permit cycle.

Background

The Chesapeake Bay Total Maximum Daily Load (TMDL) Phase 3 Action Plan will be implemented for Fort Monroe as an approach to reducing pollutants of concern (POC) discharging from Municipal Separate Storm Sewer Systems (MS4). The POC are total Nitrogen (TN) and total Phosphorous (TP). Because the Fort Monroe Authority is an MS4 operator, the General VPDES permit for Discharges of Stormwater from Small Municipal Separate Storm Sewer Systems (VAR04) (MS4 Permit) requires a developed Chesapeake Bay TMDL Action Plan to be submitted to DEQ.

This Action Plan demonstrates the proceedings that Fort Monroe have in place as well as the efforts that will need to be applied in order to comply with the MS4 Permit standards. It describes what Fort Monroe has accomplished during the first (2013 – 2018) and second (2018-2023) permit cycles to meet their 5% and 40% reductions, respectively. It also describes methods to meet the required nutrient and sediment loading reductions and amount of reduction required to achieve 100% progress in the current permit cycle. The Action Plan includes calculations of the FMA MS4 area load as of June 30, 2023; the load attributable to new construction that occurred between 2009 and June 30, 2018 and loads estimated to be generated from projects utilizing the Grandfathering provisions of 9VAC25-870-48. It also describes the management practices and retrofit programs (including improvements from redevelopment) that have been implemented between July 1, 2009 and the end of the second permit cycle to achieve the 40.0% reductions required for existing development.

Fort Monroe is a significant piece of property that has both historical and military richness. Residents and visitors have access to numerous beaches, park services, and martial structures. It is located in Hampton, Virginia but only attached to Hampton to the north. The other three sides are bounded by water; the Chesapeake Bay to the east and south and Mill Creek to the west, separating it from Hampton. Fort Monroe is the largest moat-encircled stone fortification in North America. It is a diverse landscape with 565 acres of which 8 miles are waterfront, 3 miles are beaches, and 85 acres are wetlands. Land use includes, but is not limited to, commercial, residential, National Park Service owned Fort Monroe National Monument area, and industrial. In 2000, the population was 1,253 residents according to the 2000 census. Due to the exit of the U.S. Army the population fell to 696 residents in 2010 according to the U.S. Census Bureau. The U.S. 2020 Decennial Census counted 494 residents in Fort

Monroe. Fort Monroe is entirely in the Chesapeake Bay Watershed which encompasses 100% of the drainage area.

Current Program and Existing Legal Authority

The Fort Monroe Authority (FMA) holds legal authority over the lands covered by MS4 Permit No. VAR040130. The Fort Monroe Authority Act gives the FMA several legal rights in the Code of Virginia:

§2.2-2336.B.4. It is the policy of the Commonwealth to protect the historic resources at Fort Monroe, provide public access to the Fort's historic resources and recreational opportunities, exercise exemplary stewardship of the Fort's natural resources, and maintain Fort Monroe in perpetuity as a place that is a desirable one in which to reside, do business, and visit, all in a way that is economically sustainable;

Through this legislation the Authority is able to manage and govern the land within the laws of the Commonwealth of Virginia and feels this is sufficient legal authority to comply with the Chesapeake Bay TMDL Special Condition.

New or Modified Legal Authority

No new legal authorities are required to implement the Chesapeake Bay Action Plan Special Conditions.

Means and Methods to Address Discharges from New Sources

The FMA is governed by a Board of Trustees with staff management of Commonwealth of Virginia lands at Fort Monroe without police power ordinances. An Erosion and Sediment Control policy/construction permit requirement is implemented that requires erosion and sediment controls on construction activities that result in land disturbance of greater than or equal to 2,500 square feet. This program is administered consistent with the Virginia Erosion and Sediment Control Regulations found at 9 VAC 25-850-10 et seq. and the approved Erosion and Sediment Control Annual Standards and Specifications filed with the Department each year.

As described in the recent MS4 program plan, FMA plans to undertake the following actions.

- FMA staff will begin reviewing the Erosion and Sediment Control Plans submitted by construction contractors, or others, for adherence to the state Erosion and Sediment Control Law and the approved Fort Monroe Erosion and Sediment Control Annual Standards and Specifications.
- A construction permit policy has been implemented that mandates VSMP Construction General Permits be obtained for construction activities that result in a land disturbance of greater than or equal to 43,560 square feet (one acre) or for smaller land disturbance amounts that are part of a common plan of development that disturbs greater than or equal to 43,560 square feet (one acre).
- Fort Monroe has developed and filed with the Department Annual Stormwater Management Standards and Specifications that address post-construction site runoff on construction activities that result in a land disturbance of greater than or equal to 2,500 square feet consistent with the Virginia Stormwater Management Regulations (9 VAC 25-870 et seq.).

Estimated Existing Source Loads and Calculated Total Pollutant of Concern (POC) Required Reductions

The existing loads being discharged by the MS4 based on the 2009 progress run have been calculated per the Chesapeake Bay TMDL Special Condition Guidance document dated May 18, 2015.

MS4 Area Determination

The Fort Monroe peninsula is located wholly within the City of Hampton in the Commonwealth of Virginia. The total surveyed land area of Fort Monroe is 561.35 acres as calculated in the U.S. State Plane Virginia South (U.S. Survey Feet) coordinate system, but much of the total acreage is owned and operated by agencies other than the FMA and ownership is continually evolving as the FMA fulfills its programmatic goals. Substantial changes in ownership occurred in the period between 2015 and 2018 and were shown in the previous TMDL Action Plan. An additional approximately 4.97 acres known as the Chamberlin, was transferred from the U.S. Army to the Commonwealth of VA recently (Table 1, Figure 2). Calculations for reductions moving forward now include the Chamberlin property. No MS4 area changes were made due to expanded 2020 census urban areas.

Additional land transfers are still possible, and this document will be updated as applicable.

| Land Ownership | Acres (2015) | Acres (2018) | Acres (2023) | Delta (Acres) |
|--|-------------------------|-------------------------|-------------------------|--------------------------|
| Fort Monroe Total Area | 561.35 | 561.35 | 561.35 | 0.00 |
| <i>National Park Service (Federal)</i> | <i>121.63</i> | <i>243.96</i> | <i>243.96</i> | <i>122.33</i> |
| <i>U.S. Army (Federal)</i> | <i>249.29</i> | <i>4.97</i> | <i>0</i> | <i>-249.29</i> |
| <i>Department of Homeland Security (Federal)</i> | <i>0.06</i> | <i>0.06</i> | <i>0.06</i> | <i>0.00</i> |
| <i>Fort Monroe Authority (State)</i> | <i>190.37</i> | <i>312.46</i> | <i>317.33</i> | <i>126.96</i> |

Table 1: Land ownership changes at Fort Monroe.

Excluded Lands

Due to land transfers that have occurred between 2018 and 2023, FMA has recalculated their exclusion areas as specified below.

The FMA currently has no jurisdiction over lands owned and operated by other agencies within its boundaries. For this reason, it is excluding the 244.02 acres of land owned or managed by other entities as depicted in Figure 2. Of the remaining 317.33 acres operated by FMA 18.46 acres is accounted for by the moat surrounding the inner fort and which is considered open water and 31.2 acres extend into Mill Creek leaving a total of 267.67 acres of regulated land.

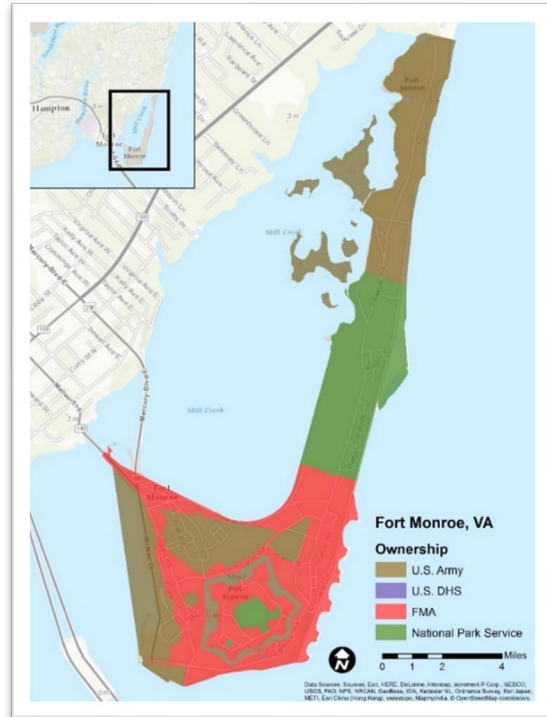


Figure 1: Property Ownership in 2015



Figure 2: Property Ownership in 2023, including Chamberlin transfer.

Final MS4 Service area

The final MS4 Service area as of September 2023 is the remaining land area consisting of 267.67 regulated acres. This document assumes the service area depicted in Figure 3. This has been updated to reflect the ownership explained above.

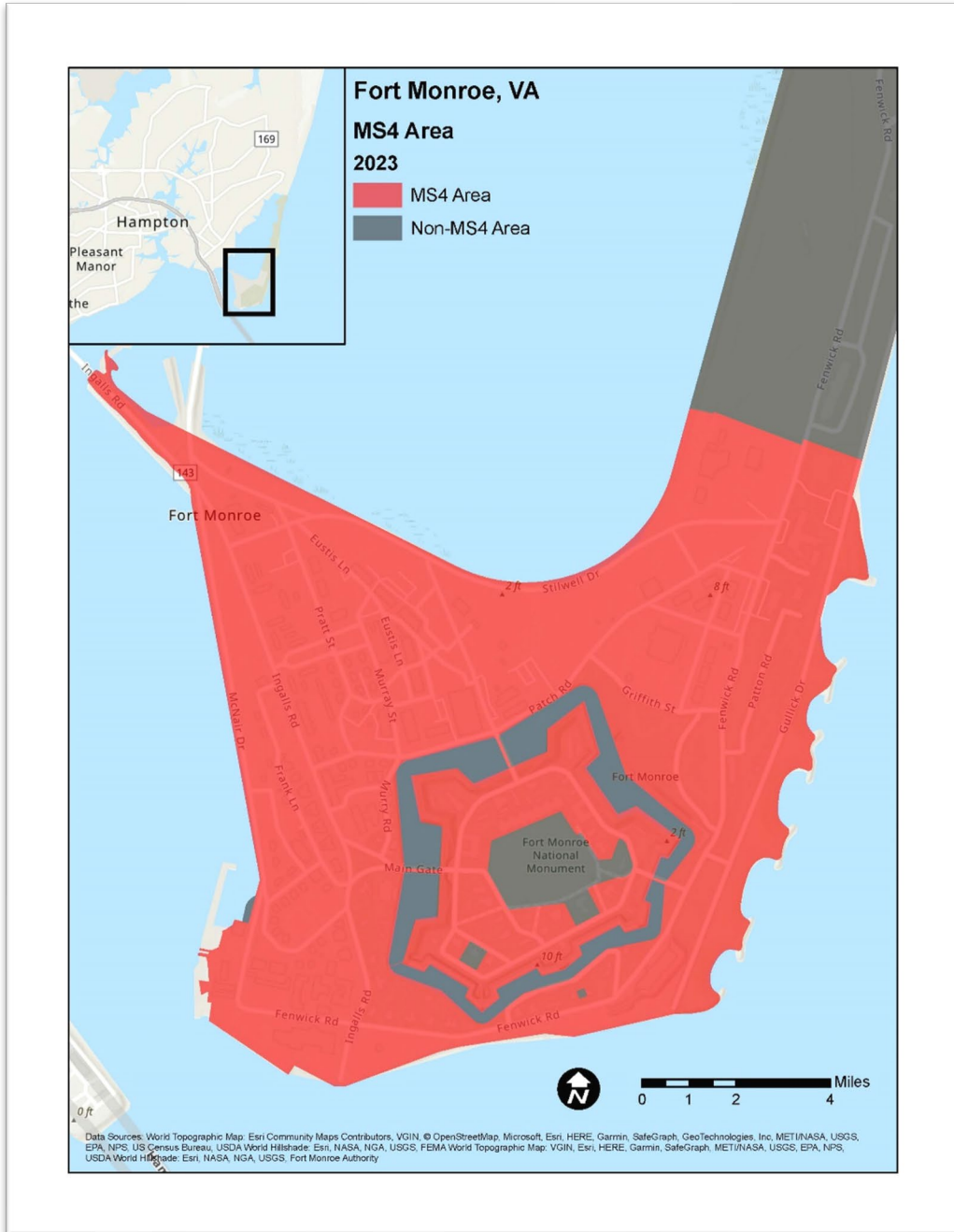


Figure 3: Final MS4 service area.

Land Cover Analysis

Existing loads for POCs have been calculated using supervised image classification on aerial photography dated March 2009 from the Virginia Geographic Information Network (VGIN). Data were classified at a 1-foot pixel size into the following classes:

- Impervious
- Managed Turf
- Forest
- Wetlands
- Open Water
- Other/Sand/Beach Dune.

For this exercise, all classes except impervious and open water were combined to encompass the MS4 Urban Pervious Category. The Impervious class was used to find the MS4 Urban Impervious acreage. These 2 classes, pervious and impervious, were intersected with the mapped MS4 Permit Area and the corresponding total 2009 loads for Pollutant of Concerns are shown in Table 2 and the required 5% reduction based on 2009 areas are shown in Table 3.

| Table 2a: Calculation Sheet for Estimating Existing Source Loads for the James River Basin (2009) *Based on Chesapeake Bay Program Watershed Model Phase 5.3.2 | | | | | |
|---|------------------------|---|--|---|-------------------------------------|
| <u>Subsource</u> | <u>Pollutant</u> | <u>Total Existing Acres Served by MS4 (6/30/09)</u> | <u>2009 EOS Loading Rate (lbs/ac/yr)</u> | <u>Estimated Total POC Load Based on 2009 Progress Run (lbs/yr)</u> | <u>Totals 2009 Loading (lbs/yr)</u> |
| Regulated Urban Impervious | Total Nitrogen | 129.19 | 9.39 | 1,213.10 | 2,134.27 |
| Regulated Urban Pervious | | 131.78 | 6.99 | 921.17 | |
| Regulated Urban Impervious | Total Phosphorus | 129.19 | 1.76 | 227.38 | 293.27 |
| Regulated Urban Pervious | | 131.78 | 0.5 | 65.89 | |
| Regulated Urban Impervious | Total Suspended Solids | 129.19 | 676.94 | 87,454.49 | 100,775.16 |
| Regulated Urban Pervious | | 131.78 | 101.08 | 13,320.67 | |

Table 2: 2009 estimated loads based on Land Cover in 2009

| Table 3a: Calculation Sheet for Estimating Source Reductions for the James River Basin | | | | | |
|---|------------------------|---|--|--|----------------------------|
| Subsource | Pollutant | Total Existing Acres Served by MS4 (6/30/09) | 5% of 2009 EOS Loading Rate (lbs/ac/yr) | 5% Estimated Total POC Load Based on 2009 Progress Run (lbs/yr) | Totals 5% Reduction |
| Regulated Urban Impervious | Total Nitrogen | 129.19 | 0.042255 | 5.46 | 8.22 |
| Regulated Urban Pervious | | 131.78 | 0.02097 | 2.76 | |
| Regulated Urban Impervious | Total Phosphorus | 129.19 | 0.01408 | 1.82 | 2.06 |
| Regulated Urban Pervious | | 131.78 | 0.0018125 | 0.24 | |
| Regulated Urban Impervious | Total Suspended Solids | 129.19 | 6.7694 | 874.54 | 932.82 |
| Regulated Urban Pervious | | 131.78 | 0.442225 | 58.28 | |

Table 3: Estimated 5% required reduction during first permit cycle

In order to plan for future required pollutant load reductions, FMA used the required 5% reduction values in Table 3 (above) to extrapolate the 40% and 100% values required in permit cycles two and three (Table 4).

| Pollutant of Concern | 5% Required in 1st Permit Cycle | 40% Required in 2nd Permit Cycle | 100% Required by 3rd Permit Cycle |
|-----------------------------|---|--|---|
| Total Nitrogen | 8.23 | 65.78 | 164.45 |
| Total Phosphorus | 2.06 | 16.46 | 41.16 |
| Total Suspended Solids | 932.82 | 7,462.58 | 18,656.46 |

Table 4: Extrapolated reduction requirements.

Means and Methods to Meet the Required Reductions and Schedule 5% Compliance (First permit term compliance 2014-2018)

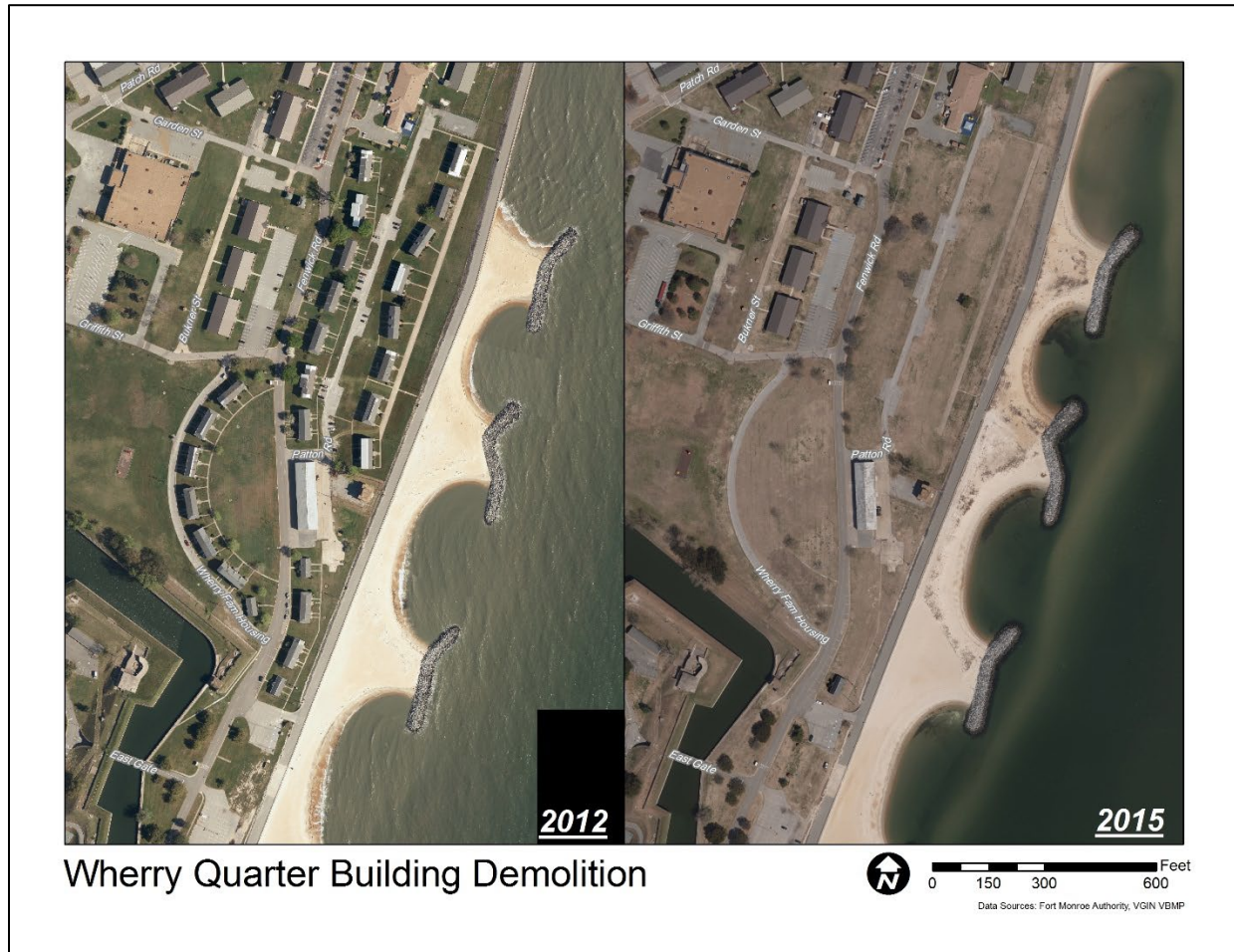


Figure 4: Land use change resulting in a 3-acre impervious area reduction.

The Fort Monroe Authority has undergone several major land use changes, including the demolition of large areas of impervious area in the Wherry Quarter of Fort Monroe (Figure). The conversion of the Wherry Quarter to Green Space satisfied the reduction requirements for the first 5% for this permit cycle. As of October 1, 2015 Fort Monroe met the required POC reductions by decreasing impervious area within the MS4 area by approximately 3.70 acres. This is a substantial decrease for an MS4 of this small size.

Calculations using the land conversion BMP (Impervious to Pervious) in the TMDL Guidance documents are shown in Table 5 and progress towards the total goals of the program are shown in Table 6 and Table 7. Fort Monroe completed 15 to 16% of total reductions for TP and TSS and is also above the 5% goal for TN. ***Note: Tables 5-7 below show calculations based on MS4 area at time of 2015 permit cycle.**

| Pollutant | Edge of Stream Reductions (lbs/ac/yr) | Acres Converted from Impervious to Pervious | Reduction (lbs/ac/yr) |
|------------------------|---------------------------------------|---|-----------------------|
| Nitrogen | 2.29 | 3.70 | 8.47 |
| Phosphorus | 1.60 | 3.70 | 5.92 |
| Total Suspended Solids | 817.29 | 3.70 | 3,023.97 |

Table 5: Reduction using Land Cover Conversion BMP

| Pollutant of Concern | 2009 (lbs/ac/yr) | Decrease (lbs/ac/yr) | Required 5% Reduction | Excess (lbs/ac/yr) | % Above Goal |
|----------------------|------------------|----------------------|-----------------------|--------------------|--------------|
| TN | 2,134.27 | 8.47 | 8.22 | 0.25 | 3% |
| TP | 293.27 | 5.92 | 2.06 | 3.86 | 188% |
| TSS | 100,775.16 | 3,023.97 | 932.82 | 2,091.15 | 224% |

Table 6: Land use change POC summary.

| Pollutant of Concern | Phase 1 Reductions (lbs/yr) | 100% Reductions (lbs/yr) | Percent of Total Required |
|----------------------|-----------------------------|--------------------------|---------------------------|
| TN | 8.47 | 164.45 | 5.15% |
| TP | 5.92 | 41.16 | 14.38% |
| TSS | 3,023.97 | 18,656.46 | 16.21% |

Table 7: Progress towards overall goals.

40% Compliance (Second permit term 2019-2023)

The Fort Monroe Authority applied for, and received, acceptance into the Hampton Roads Sanitation District's Sustainable Water Initiative for Tomorrow (SWIFT) program to meet the required 40% total reduction prior to the end of the second permit term. The SWIFT program aims to transform treated wastewater into additional drinking water and groundwater through additional advanced treatment. This program is designed to improve and protect a broad range of ecological functions in the Hampton Roads area. On June 1, 2023, FMA received 65.78 lbs/yr of TN, 10.54 lbs/yr of TP, and 4,438.55 lbs/yr of TSS to meet the 40% reduction as calculated in the Phase 2 action plan. A copy of the credit transfer is attached. ***Note: Table 8 below shows calculations based on MS4 area at time of 2018 permit cycle and does not include the Chamberlin transfer.**

| Pollutant of Concern | Phase 2 Cumulative Reductions (lbs/yr) | Required 40% Reductions (lbs/yr) | % of Goal |
|----------------------|--|----------------------------------|-----------|
| TN | 74.25 | 65.78 | 113% |
| TP | 16.46 | 16.46 | 100% |
| TSS | 7,462.58 | 7,462.58 | 100% |

Table 8. 40% Reduction Progress

100% Compliance (Third permit term 2024-2029)

FMA is currently assessing options for obtaining 100% compliance as required during the third term of the MS4 permit. Table 9 shows updated calculations based on the new MS4 area. Table 10 displays the reduction requirement as extrapolated from the requirements detailed in the Chesapeake Bay TMDL Special Condition Guidance (GM15-2005). Reduction requirements are rounded to the nearest whole number, according to 2024 permit requirements.

The Chamberlin property (5.07 acres) has been included in the MS4 area for this permit cycle. Acquisition of the Chamberlin property will require an updated nutrient reductions to maintain the required 40%. Updated 40% reduction values will be 74 lbs/yr of nitrogen and 17 lbs/yr of phosphorous. FMA intends to obtain the additional credits from HRSD, via SWIFT, to make up the difference caused by the land acquisition. The most recent 40% transfer on June 1, 2024 reflects the change and is attached. FMA is currently coordinating the HRSD to finalize the new credit 100% transfer amounts, anticipated to be formalized by end of 2024.

| Table 9: Calculation Sheet for Estimating Existing Source Loads for the James River Basin (2009) *Based on Chesapeake Bay Program Watershed Model Phase 5.3.2131 | | | | | | |
|---|------------------------|---|--|---|--|--------------------------------------|
| Subsource | Pollutant | Total Existing Acres Served by MS4 (6/30/23) | 2009 EOS Loading Rate (lbs/ac/yr) | Estimated Total POC Load Based on 2009 Progress Run (lbs/yr) | 100% Cumulative Reduction Required by 10/31/2028 (lbs/yr) | Total 100% Reduction (lbs/yr) |
| Regulated Urban Impervious | Total Nitrogen | 134.26 | 9.39 | 1,260.70 | 113.46 | 169 |
| Regulated Urban Pervious | | 131.78 | 6.99 | 921.14 | 55.27 | |
| Regulated Urban Impervious | Total Phosphorus | 134.26 | 1.76 | 236.30 | 37.81 | 43 |
| Regulated Urban Pervious | | 131.78 | 0.5 | 65.89 | 4.78 | |
| Regulated Urban Impervious | Total Suspended Solids | 134.26 | 676.94 | 90,886 | N/A | N/A |
| Regulated Urban Pervious | | 131.78 | 101.08 | 13,321 | N/A | |

Table 9. 2023 Updated MS4 Reduction Calculations

| Pollutant of Concern | Phase 1 Reductions (lbs/yr) | Phase 2 Reductions (lbs/yr) | Required 100% Reductions (lbs/yr) | Remaining Reduction Required |
|-----------------------------|------------------------------------|------------------------------------|--|-------------------------------------|
| Nitrogen | 8.47 | 74 | 169 | 95 |
| Phosphorus | 5.92 | 17 | 43 | 26 |
| Total Suspended Solids | 3,023 | 7,463 | N/A | N/A |

Table 10: 100% Reduction Requirements

The FMA intends to utilize SWIFT for its remaining nitrogen (95 lbs/yr) and phosphorous (26 lbs/yr) to reach 100% reductions. In the 2024 permit cycle, additional reductions for total suspended solids are no longer required. Special consideration is required when assessing projects for this goal due to the unique historical nature of the Fort Monroe peninsula. The FMA anticipates continued credits through

inclusion in the SWIFT program to fulfill required 100% reduction. Other opportunities for structural BMPs may be limited due to many factors, including, but limited to:

- Consideration for archeological findings;
- Unexploded ordinance from military activities;
- Environmental resources; and,
- Existing infrastructure.

Costs to Achieve 100% Reductions

The Sustainable Water Initiative for Tomorrow (SWIFT) program is a free resource provided by Hampton Roads Sanitation District (HRSD). Participation in the program is anticipated to have no quantifiable cost to the FMA.

Means and methods to offset increased loads from new sources initiating construction between July 1, 2009 and October 31, 2023

Special Condition Requirement 4 (Section II.A.4) of the General Permit requires permittees to offset 100% of the increased loads from new sources initiating construction between July 1, 2009 and October 31, 2023, and designed in accordance with 9VAC25-870 Part II C (9VAC25-870-93 et seq.) if the following conditions apply:

- a. The activity disturbed one acre or greater; and
- b. The resulting total phosphorous load was greater than 0.45 lb/acre/year, which is equivalent to an average land cover condition of 16% impervious cover.

No regulated land disturbance activities occurred between November 1, 2018 and October 31, 2023. Therefore, additional offsets are not required.

Means and methods to offset increased loads from grandfathered projects that begin construction after July 1, 2014

Special Condition Requirement 5 refers to General Permit Section II.A.5 and applies to permittees that will have future grandfathered projects in accordance with 9VAC25-870-48. As there have been no Grandfathered Projects at Fort Monroe and therefore means and methods to offset increased loads are not necessary.

An estimate of the expected cost to implement the necessary reductions

Fort Monroe has met the estimated 5% reduction on all POCs required under the TMDL Special Condition as shown in Table 6. There will be no additional cost to implement the remaining reductions through SWIFT.

Public Comments on Draft Action Plan

The Phase 3 Draft Action Plan for Permit Cycle 3 (fiscal years 2024 – 2029) was posted to the environmental portion of the Fort Monroe Authority Website for public comments between August 30, 2024 and September 16, 2024. No comments were received.