

**DRAFT STATEMENT OF FINDINGS FOR
EXECUTIVE ORDER 11988, FLOODPLAIN MANAGEMENT**

Stabilize Mint Spring Bayou
Vicksburg National Military Park
Vicksburg, Mississippi

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Executive Order (EO) 11988 (Floodplain Management) and Executive Order 13690 (Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input), require the NPS and other federal agencies to evaluate the likely impacts of actions in floodplains, and to improve the Nation's resilience to flood risk. The objective of EO 11988 is to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative. EO 13690 was issued to establish a Flood Risk Management Standard (FFRMS) for federally funded projects to improve the nation's resilience to floods, and to insure new federal infrastructure will last as long as intended. NPS procedures for complying with the floodplain Executive Orders are outlined in NPS Directors Order and Procedural Manual 77-2, DO 77-2 and PM 77-2, respectively. This Statement of Findings (SOF) documents compliance with these NPS floodplain management procedures.

INTRODUCTION

The National Park Service (NPS) proposes to stabilize an eroding bluff adjacent to the Vicksburg National Cemetery in the Vicksburg National Military Park (the park). A previous project completed in 2011 consisted of the installation of two soil nail walls with shotcrete facing. At the base of the lower nail wall, the soil has become unstable and is sliding to the south causing movement of the Mint Spring Bayou bank in response. Potentially adding to the problem, when the Yazoo Diversion Canal/Mississippi River reach flood stage, the backwaters reach up Mint Spring Bayou such that much of the slope below the bluff is inundated. Therefore, the area could be subject to rapid drawdown conditions depending on the rate that the water recedes.

PROPOSED ACTION

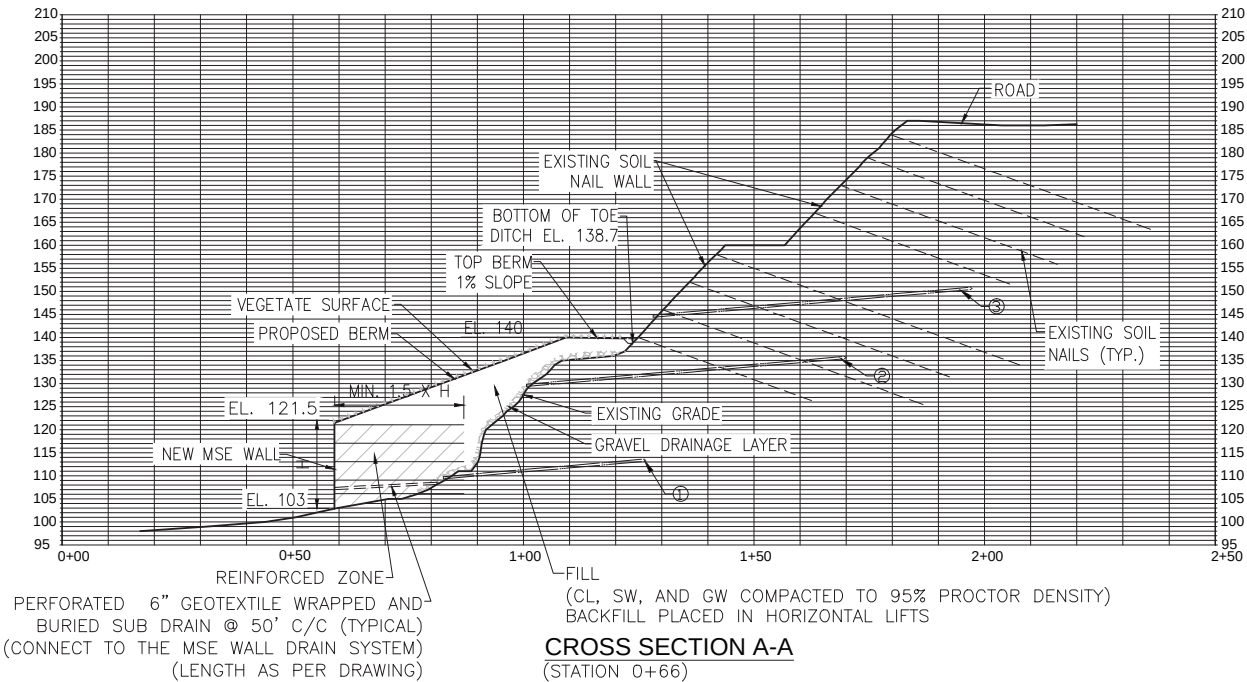
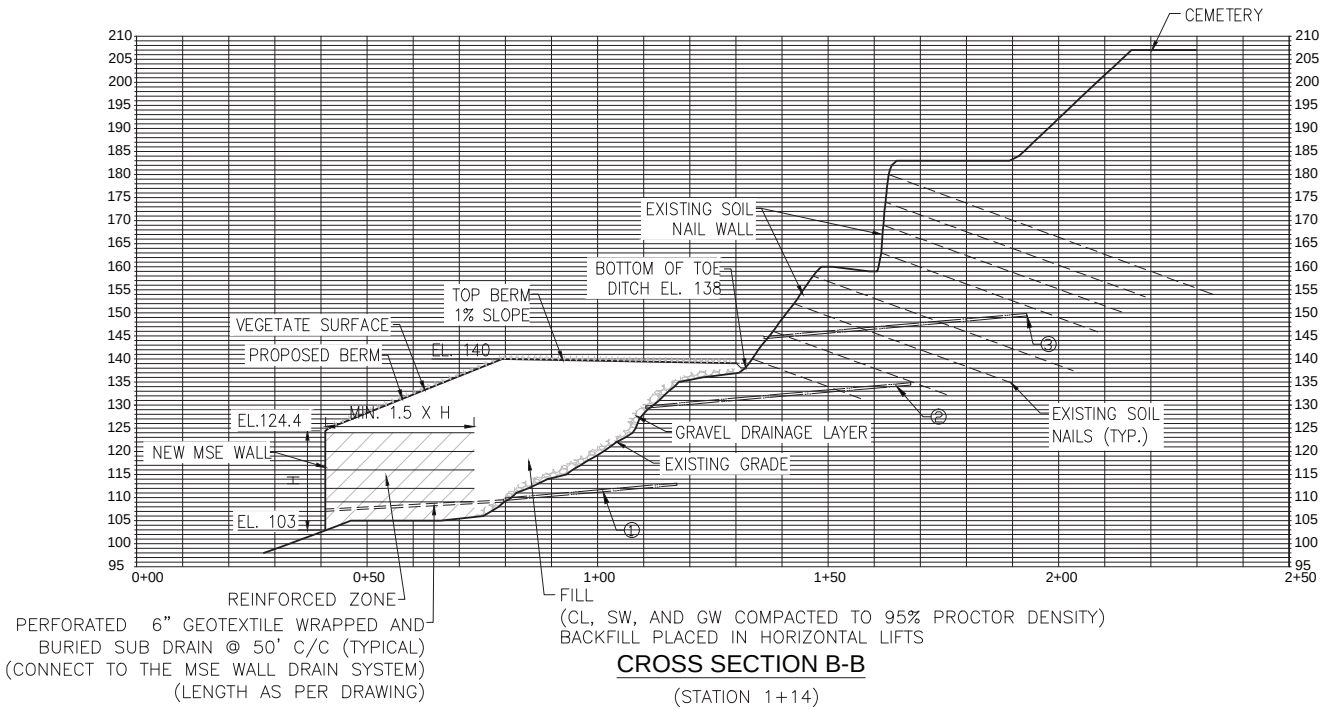
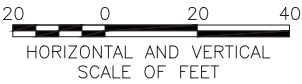
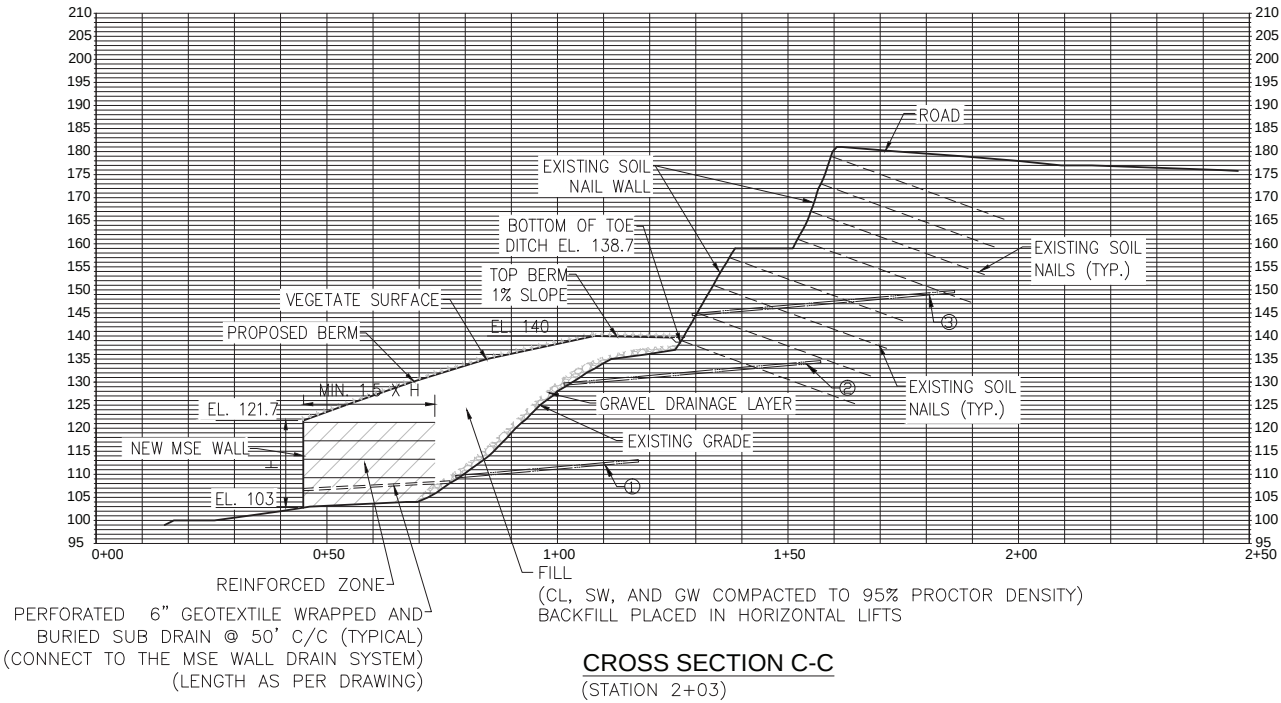
The unique geologic conditions that exist within the valley of Mint Spring Bayou have caused the bluff on which the National Cemetery is situated to slough off and erode. The southern brick wall around the cemetery has already collapsed and fallen into Mint Spring. Erosion has also claimed a cemetery road and exposed human remains, and threatens the remaining tour road, the historic Indian Mound, cemetery gazebo, and hundreds of interments in the southwest corner of the cemetery.

To stabilize the eroding slope, the National Park Service proposes to install a Mechanically Stabilized Earth (MSE) retaining wall and a stabilized earthen berm. The wall will stabilize the slopes with the use of precast blocks or panels for the wall face and reinforced with layers of geogrids placed within the material placed as backfill for the wall. The wall will be approximately 316 feet in length and approximately 20 feet high, though the specific height may vary along its length. Engineered fill will be placed to a 2.5:1 slope above the MSE wall. A geotextile wrapped sub drain system will be installed at the base of the wall at approximately 50-foot intervals and tied into existing drainage system. In addition, horizontal drains will be constructed along the base of the upper two slopes in order to reduce water infiltration into the slope soils and facilitate drainage of the slope soils. See figures 1 and 2 for a plan view and cross sections of the proposed action, respectively.

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LEGEND

- ① PERFORATED OR SLOTTED 4" GEOTEXTILE WRAPPED HORIZONTAL DRAIN @ 50' C/C (TYPICAL) AT EL 110.00. (LENGTH AS PER DRAWING)
- ② PERFORATED OR SLOTTED 4" GEOTEXTILE WRAPPED HORIZONTAL DRAIN @ 50' C/C (TYPICAL) AT EL 130.00. (LENGTH AS PER DRAWING)
- ③ PERFORATED OR SLOTTED 4" GEOTEXTILE WRAPPED HORIZONTAL DRAIN @ 50' C/C (TYPICAL) AT EL 145.00. (LENGTH AS PER DRAWING)



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FIGURE 2
Proposed Action Cross Sections

This project is a Class I action under Director's Order #77-2: Floodplain Management because it is a proposed action in the 100-year floodplain that could impact floodplain values or capital investment. It does not entice short- or long-term occupation of the site, and therefore, protection of human life is not an issue. Additionally, because this is a federally funded project, the action is subject to the FFRMS floodplain, which may be determined by the elevation and horizontal extent of the 500-year flood.

SITE DESCRIPTION

The project area consists of approximately 3.5 acres within Vicksburg National Military Park in Vicksburg, Warren County, Mississippi (see figure 3). Vicksburg National Cemetery was established in 1866 and Vicksburg National Military Park was established in 1899. The National Park Service took over administration of both in 1933. Today, the cemetery provides the final resting place for approximately 18,500 United States servicemen, their spouses, and former cemetery workers. The project area is depicted on figure 4. It is generally bound on the south side by Mint Spring Bayou, the north side by the base of the slope of Given Hill Road, the west side by North Washington Street, and the east side boundary is approximately 800 feet east of North Washington Street.

Mint Spring Bluff starts at the south edge of the Vicksburg National Cemetery. It drops approximately 80 feet to a naturally flat area approximately 40 feet wide, then drops another 12 feet to Mint Spring Bayou. Mint Spring Bayou begins in the park and flows generally east to west into the Yazoo River Diversion Canal just west of the city of Vicksburg.

Two levels of soil nail walls were previously designed by the US Army of Corps of Engineers (USACE) and constructed for the upper portion of the slope. Soil nails up to 75 feet long were constructed. Lower portions of the slope were not reinforced and have failed at eastside and westside toes of the slope. Failed scarps and cracks are evident and are approximately 120 and 40 feet long at eastside and westside toes of the slope, respectively.

Floodplains

The project area is located adjacent to the Mint Spring Bayou and just upstream of the confluence with Yazoo Canal and 2.9 miles upstream of the confluence of the Yazoo Canal with the Mississippi River. As such, the project area is located partially within a 100-year floodplain (Zone AE) and the 500-year floodplain (Zone X), as categorized by the Federal Emergency Management Agency's Flood Insurance Rate Map (FIRM) 28149C0301D effective data November 5, 2008. The 100-year floodplain elevation is approximately 103 feet. The proposed MSE wall will be located along the fringe of the 100-year floodplain, with the toe of the wall located at elevation 103 feet. The structural wall will be partially located within the 500-year floodplain, Zone X. See figure 5 for the project's general location on the FEMA flood insurance rate map, and see figure 6 for the relationship of the base flood elevations (and a flood stage record from May 1927) to the proposed structural wall.

The mapped floodplain within the project area is based on the backwater influence from the Yazoo Canal and Mississippi River. Flooding of the bayou generally takes place only following substantial amounts of regional rainfall. When the Yazoo Diversion Canal/Mississippi River reach flood stage, the backwater effect reaches up Mint Spring Bayou such that much of the slope below the bluff is inundated.

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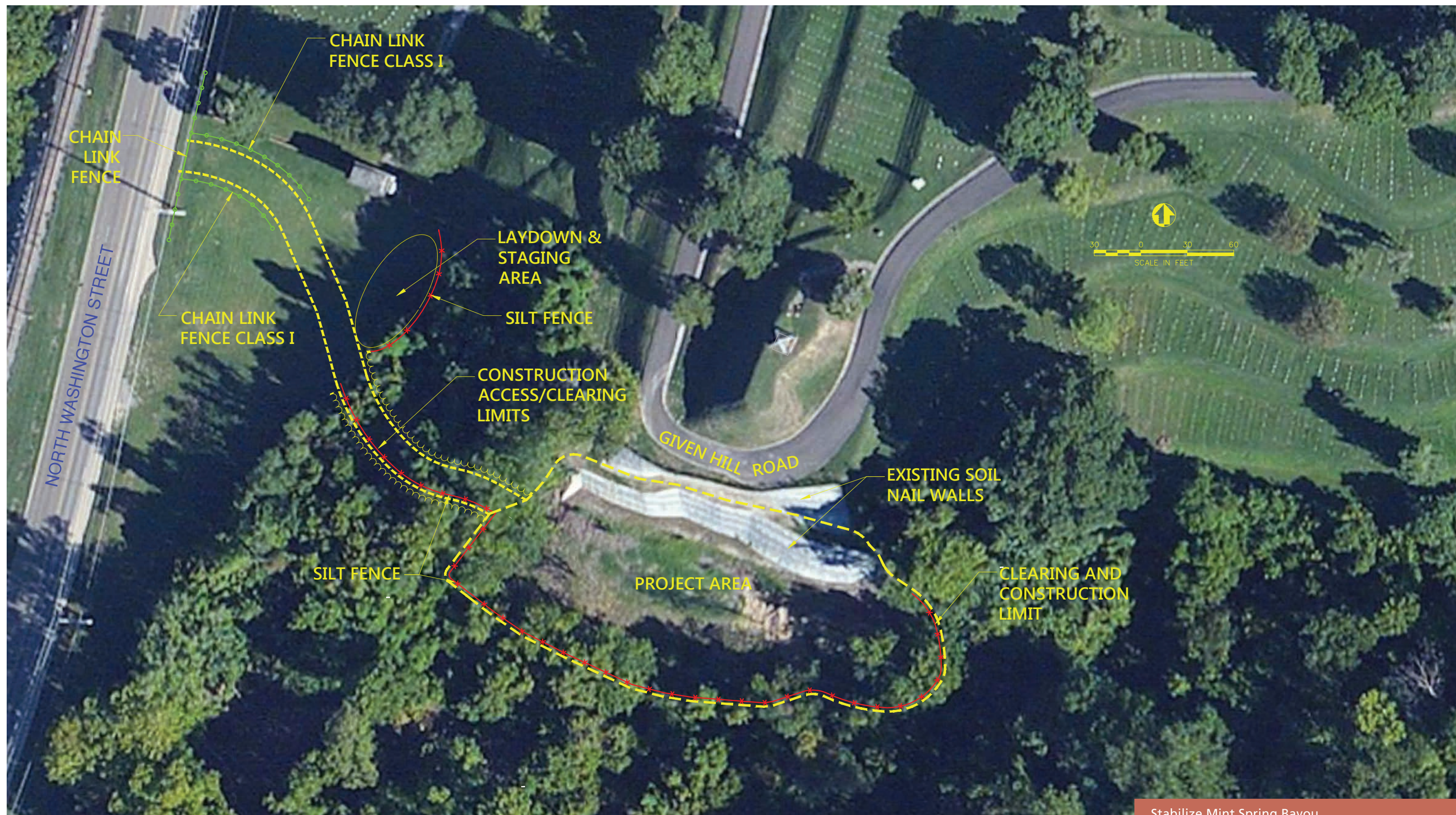
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FIGURE 3
Project Vicinity

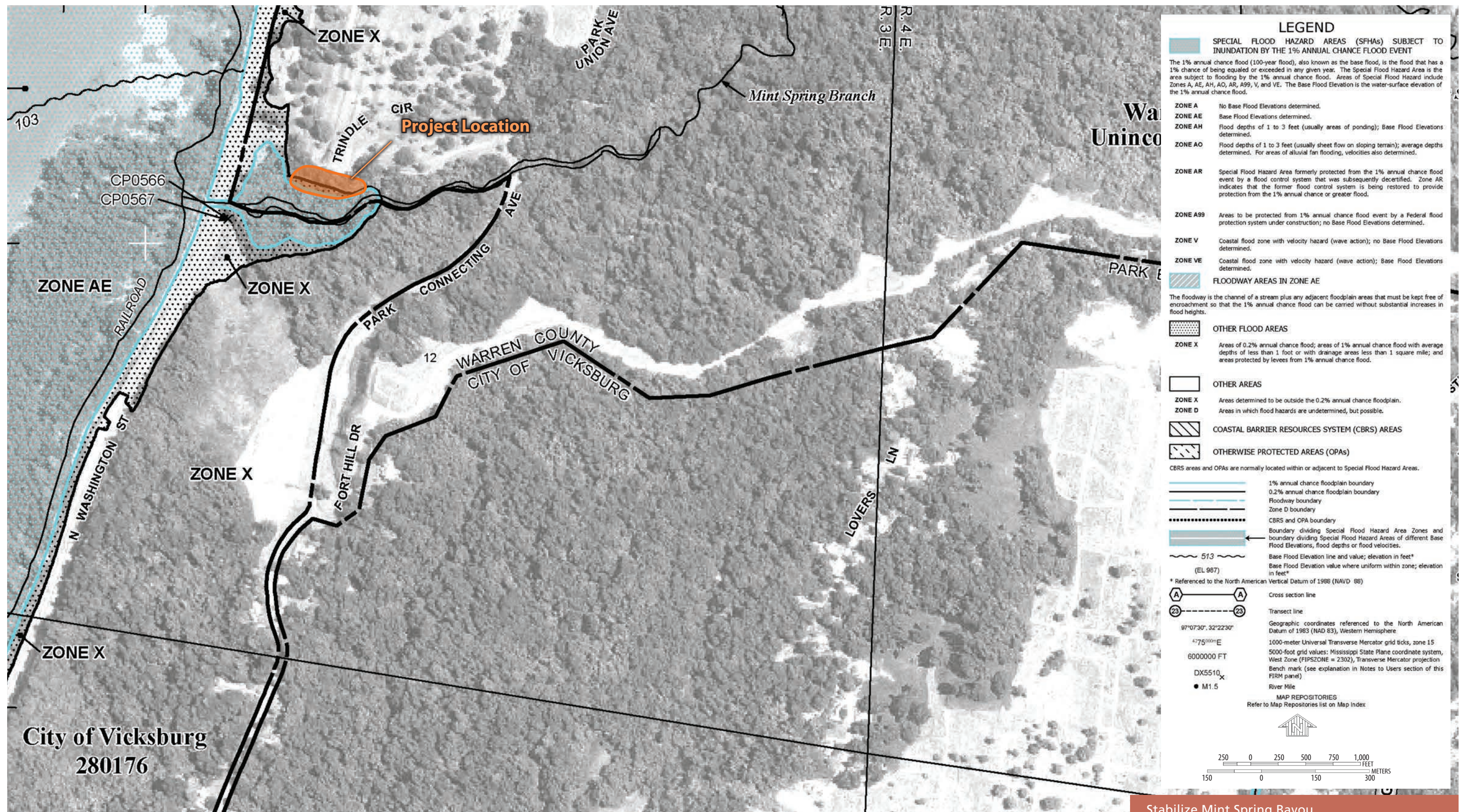


National Park Service
US Department of the Interior

Vicksburg National Military Park
Mississippi

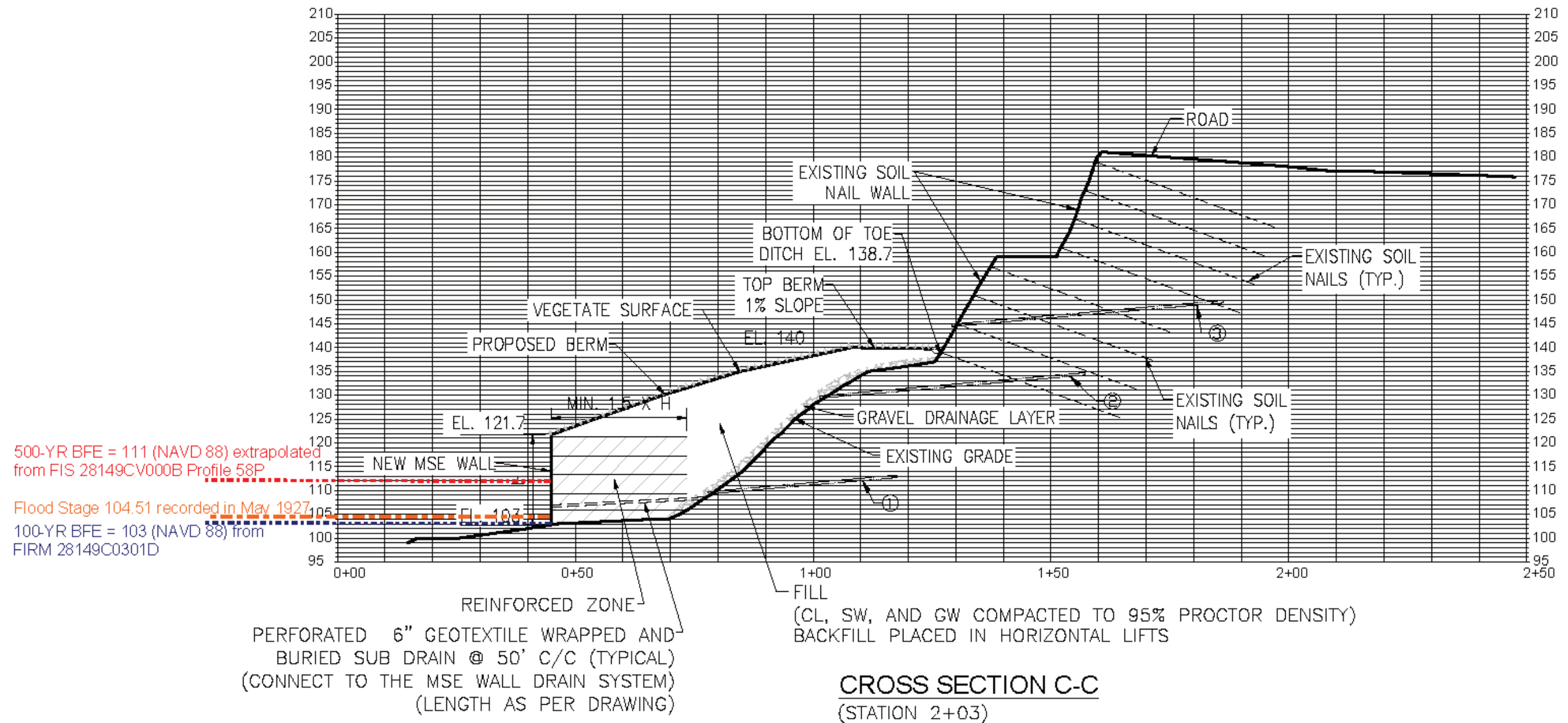


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FIGURE 5
FEMA Flood Insurance Rate Map



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FIGURE 6
Flood Elevations and Proposed Action

The area can be subject to rapid drawdown conditions in cases where flood waters then rapidly recede. During flooding events when flow is backing into the Mint Springs Bayou, and there is additional influence from North Washington Street Culvert, the backwater effect results in minimal velocities along the structural wall.

The Mississippi River has exceeded its bankfull stage of 42 feet at Vicksburg 54 times since 1901. This bankfull stage corresponds to the 88.11 feet at Mint Springs Bayou (NAVD 88). The highest stage documented at Vicksburg is 58.4 feet recorded in May 1927. This stage elevation would correspond to a flood stage elevation of 104.51-feet (NAVD 88) at Mint Spring Bayou.

The bayou floodplain is mostly vegetated with a few other manmade berms and a modest amount of impervious surface. The natural features in the floodplain continue to provide for flood water storage and conveyance during flood events.

JUSTIFICATION FOR USE OF THE FLOODPLAIN

Action is needed to stabilize Mint Spring Bluff to protect the south edge of the Vicksburg National Cemetery. The eroding slope is located along the edge of the 100-year floodplain. Therefore, the action (slope stabilization activities) must occur within the 100-year floodplain. The National Park Service finds that there are no practicable alternatives to constructing an MSE wall and berm in the vicinity of the floodplain because of the location of the existing slope.

INVESTIGATION OF ALTERNATIVE SITES AND METHODS

The project cannot be located at other sites, due to the need to stabilize this particular slope. However, other methods of slope stabilization were considered, as described below.

Using stone column was discussed by the team but not considered as a viable option because it involves a high degree of land disturbance due to the need for specialized equipment (beyond standard construction equipment), the auguring of the holes, and the removal of augured earth material. There is also a relatively high cost associated with the work without a commensurate increase in slope stabilization (benefit). Use of soil nail anchors was also discussed but dismissed due to the length of the soil anchors required at the project site. The nails would be required to be much longer than are feasible (the distance from the slope face to suitable material exceed the length of viable soil nails). Use of a shear key was also discussed but dismissed because the added cost of construction and because it did not significantly benefit the project in terms of additional predicted slope stability.

Three main alternatives for slope stabilization were discussed during the value-based decision making workshop. Alternative 1 consisted of the construction of berm (2H:1V) or embankment of material at the

toe of the slope. This alternative would require placing substantially more fill within the 100-year floodplain than the proposed action. Extending the berm into the floodplain would also place a relatively large area of the berm at risk of future erosion and scour within the area during flood events at or below the 100-year flood elevation. This alternative was found to have the highest factor of safety (highest stability); however, in addition to requiring construction within the 100-year floodplain, it would have required a greater degree of disturbance to other natural resources, including a relatively greater level of fill within wetland areas.

The actions proposed under alternative 2 provided a balance between an increased factor of safety and natural resource protection. Alternative 2 consisted of construction of the MSE wall to provide resistance to horizontal loads on the slopes. This is the alternative selected as the proposed action and is described in more detail above. Although this alternative did not score as high during the factor of safety analysis as alternative 1, it effectively increases the factor of safety while minimizing disturbance of the floodplain and other resources.

Third and final alternative discussed during the VA study was the “no action” alternative. Alternative 3 was dismissed because it does not meet the project requirements to stabilize the slope.

SITE-SPECIFIC FLOOD RISK

As mentioned above, the project area is located partially within a 100-year floodplain (Zone AE) and the 500-year floodplain (Zone X), as categorized by FIRM 28149C0301D. The 100-year floodplain elevation is approximately 103 feet. The proposed MSE wall will be located along the fringe of the 100-year floodplain, with the toe of the wall located at elevation 103 feet. The structural wall will be partially located within the 500-year floodplain, Zone X, which is one of the designated FIRM floodplains (see figures 5 and 6, referenced above).

Flood conditions along Mint Spring Branch generally occur as a result of backwater influence of the Yazoo Canal and Mississippi River. These conditions are not expected to produce substantial depths or velocities at the stabilization site and, therefore, do not present great hydraulic risk. Even though the 500 year flood is somewhat greater than the 100 year flood the intent of the design is to minimize the impact on human safety, health, and welfare, and would increase resilience against flooding in accordance with EO 13690. When tailwater conditions are not present and Mint Spring Branch is allowed to flow freely to and through the culvert under North Washington Street, the flood elevation within Mint Spring Branch should be maintained well below elevation 103 thus not impacting the structural wall.

AVOIDANCE, MINIMIZATION, AND MITIGATION

Flood mitigation is offered by incorporating methods for preserving natural processes, protecting life, and minimizing storm damage through appropriate procedures. To help protect life, no inhabitable buildings are located at the project area and the project area is closed to the public. The structure that will be added to the site will be designed in such a way as to withstand flood events while impeding flow as little as possible. The structure design will adhere to applicable floodplain standards. Mitigation to minimize storm damage will include utilization of sustainable design principles and using best management practices during and after construction.

These mitigation measures will be in accordance with the NPS floodplain guidelines and with Executive Order 11988, “Floodplain Management.” In addition, mitigation will ensure that structures and facilities are designed to be consistent with the intent of the standards and criteria of the National Flood Insurance Program (44 CFR Part 60). Therefore, the proposed project will not have an adverse impact on the floodplain and its associated value.

CONCLUSION

The proposed slope stabilization activity is necessary to protect portions of the Vicksburg National Cemetery that are being lost through continued erosion. The base of the failing slope is located in the 100-, and 500-year floodplains; and therefore, part of the stabilization must be located in the Regulatory Floodplain.

Flood conditions at this site generally occur as a result of backwater from interaction between the Mississippi River, the Yazoo Canal, and Mint Springs Branch, and therefore, associated velocities are low. Furthermore, flood depths relative to the project location are not excessive. The proposed stabilization is designed to withstand predicted hydraulics. The stabilization design that was chosen minimizes disturbance of the floodplain and other resources.

The repair and restoration activity under the proposed action is a Class I action. These actions include activities that require construction within flood prone areas but exclude infrastructure that are permanently occupied.

The NPS finds that the repair and stabilization of the slope at Mint Springs Bayou and management actions to maintain the floodplain functions and values within the bayou are essential for public use and safety, despite the fact that the actions will be located along the edge of flood-prone areas. The NPS also finds that in repairing and stabilizing the slope there are no practicable alternatives to enhance resiliency outside of the floodplain since the entire Mint Springs Bayou is within the 100-year floodplain. This project is consistent with the policies and procedures of NPS Director’s Order #77-2 (Floodplain Management) and Executive Order 11988.