

USACE Technical Assistance to Santa Barbara County Regarding Flood Control Operations on the Santa Maria River

Introduction

In January and March of 2023, significant storm events occurred that changed the course of the Santa Maria River and damaged a wastewater treatment plant, a road, housing, and agricultural lands. This occurred downstream of the leveed section of the river in and near the town of Guadalupe, CA. Although there are no flow gages in this section of the river, upstream gages and previous hydrology work estimate the January and March storms had annual exceedance probabilities (AEPs) of roughly 0.08 and 0.2, respectively. This means that over a long period of time, storms of the same size might occur on average roughly once every 10 – 15 years or once every 5 years, respectively. As a result of this damage and the prospect of continuing issues with a rerouted river, the County of Santa Barbara reached out for technical assistance in dealing with these issues. USACE has been tasked with providing technical assistance in this situation via CalOES and FEMA, and this document (in conjunction with a presentation to Santa Barbara County, CalOES, and FEMA on August 31, 2023) serves as a brief summary of our technical assistance on this matter. The nature of this assistance was specified as being in regard to “temporary solutions” that could be potentially implemented before the flood season for water year (WY) 2024.

Areas of Impact

Technical assistance was requested for addressing four areas impacted by flooding during WY 2023:

1. A residence at the western end of 9th Street
2. Houses on Pioneer Street
3. Guadalupe’s Wastewater Treatment Plant (WWTP)
4. West Main Street, and the rerouting of the river that caused the destruction of portions of this road.

A map of these areas is shown in Attachment 1.

Types of Barriers Considered


Gabion baskets are composed of a wire mesh that is filled with rocks of moderate size (see Figure 1). Putting them within the mesh provides a measure of structure to them so that they are not moved by rapidly flowing water as easily as the individual stones are. The wire mesh also provides some limited flexibility, so that if there is erosion at the toe of the structure under the basket, the basket can drop into that space and prevent further erosion.

Gabion baskets work well for erosion control, but as might be expected from the picture, they are quite porous and are not a good option when another (less porous) barrier is not behind them. Thus, they might help when in front of a sand berm or when a steep river bank is expected to erode, but not when




Figure 2. HESCO Baskets Being Filled

Flood Barriers Technical Specification Sheet FL4836 Unit



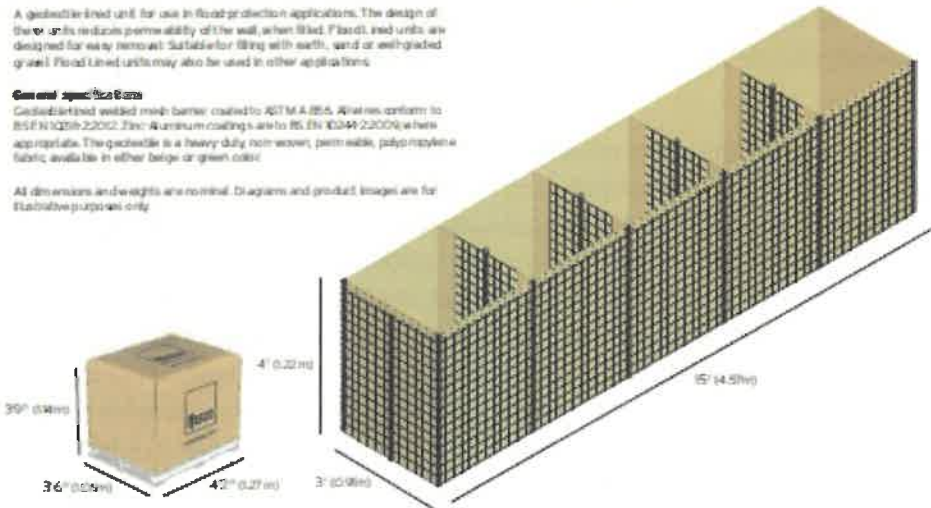
| Unit | Height | Width | Length |
|--------------------|-------------|-------------|---------------|
| FL 4836 (Beige) | 4' 1.22m | 3' 0.91m | 55' 16.76m |
| FL 4836 (Green) | 4' 1.22m | 3' 0.91m | 55' 16.76m |



A galvanized lined unit for use in flood protection applications. The design of these units reduces permeability of the wall, when filled. Flood lined units are designed for easy removal. Suitable for filling with earth, sand or well graded gravel. Flood lined units may also be used in other applications.

General Specifications
 Galvanized lined welded mesh barrier coated to ASTM A855. Alkalies conform to BS EN 12359-2:2002. Zinc Aluminum coatings are to BS EN 10346:2000 where appropriate. The geotextile is a heavy duty non-woven, polymeric, polypropylene fabric available in either beige or green color.

All dimensions and weights are nominal. Diagrams and product images are for illustrative purposes only.



36" (0.91m) 4' (1.22m) 55' (16.76m)

Figure 3. HESCO Basket Diagram

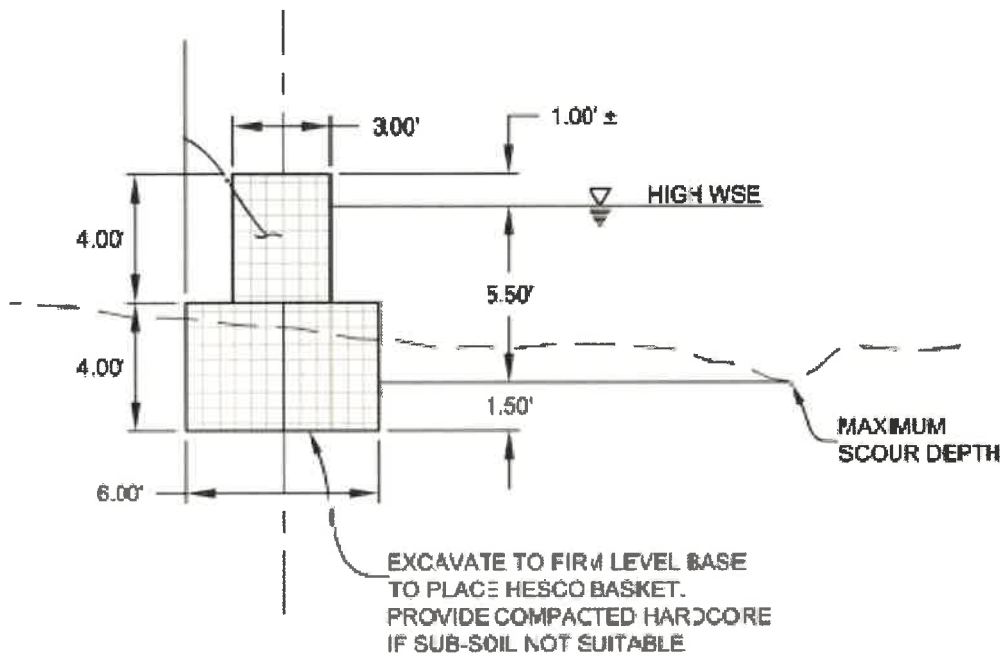


Figure 4. Stacked HESCOs. (listed maximum scour depth is only approximate and does not come from sediment analysis)

Pertinent Regulatory Issues

A clause in the Nationwide Permits (33 CFR Part 330) says that if the river leaves its normal channel and forms a new one, then the property owner has one year to reclaim their land and redirect channel flow back to the old channel. The old channel, rather than the new, is considered the jurisdictional waters of the U.S. and subject to permit requirements for up to one year after the change in the location of the active channel occurs).

Any placement of bank stabilization in the active channel below the Ordinary Highwater Mark of the Santa Maria River would require an authorization pursuant to Section 404 of the Clean Water Act. With the requirement for a Section 404 Permit, the Corps, Regulatory Division must comply with the Endangered Species Act, which would require consultation with NOAA Fisheries for potential adverse impacts to steelhead and designated critical habitat for steelhead. Consultation with NOAA Fisheries could delay the proposed project and result in additional and substantial mitigation measures to avoid and minimize impacts to steelhead and designated critical habitat for steelhead. Placement of bank stabilization outside of the active channel above the Ordinary Highwater Mark of the Santa Maria River would not require an authorization pursuant to Section 404 of the Clean Water Act, and as a result, would require no further action by the Corps, Regulatory Division.

Discussions with the County of Santa Barbara have already taken place with regard to the applicable regulatory issues, and they are encouraged to reach out to Dr. Aaron Allen, Chief of the North Coast Branch, Regulatory Division of the Los Angeles District, USACE for any further clarification needed.

Residence at the end of 9th Street

As shown in Figure 5, a residence exists to the west of Pioneer Street at the western end of 9th Street. It lies quite close to the river, and Guadalupe's Fire Captain stated that water was approximately 6 feet deep here during the January storm.

USACE suggests that a ring of HESCO baskets could be applied here and one possible alignment is shown in Figure 6. It is possible fill these baskets in advance, but leave an opening in the barrier until the storm is approaching and then fill and close the ring. A suggestion has been made by the County of Santa Barbara that a passage through the barrier be left, but this passage built up as a permanent exit and entry point roughly equal in elevation to the intended top of barrier. This could be an effective way to allow egress, as long as the slopes are implemented somewhat gradually, since the HESCO baskets have limited flexibility to adjust quickly changing ground slopes.



Figure 5. 9th Street House (seen in upper mid-left of picture)



Figure 6. HESCO Alignment for 9th Street House

Cost estimates have been provided for this option and are attached, with one including a single row of baskets and one including a stack two rows high. Detailed hydraulic modeling was not done on this area, because accurate topo data was not available at the time. Both cost estimates are provided to allow Santa Barbara County to decide which height of barrier to implement.

Pioneer Street

Anecdotal evidence (from Guadalupe's Police Chief) places the high-water mark of the January storm at about 3 feet high for buildings on the west side of Pioneer Street in Guadalupe. Water was only about 1-2 feet high for buildings on the east side of Pioneer Street. No flooding occurred in this location during the March storm and the most recent flooding known prior to the January 2023 events was in December 2010, which was nearly identical in magnitude to the January 2023 storm in flow rate.

A breakout point on the left bank of the Santa Maria River, looking downstream, a few hundred feet downstream of the Hwy 1 bridge (shown in Attachment 1) is believed to have contributed to this flooding. The cross section of the channel is relatively small and other flow paths may have also contributed to the flooding at Pioneer Street.

HESCO baskets are recommended as the best solution for Pioneer Street and two possible alignments are presented for consideration in Figure 7. Alignment A allows for passage on 9th Street to the house referred to the section above, but may create access issues for the house on the NE corner of Pioneer and 9th Streets, while Alignment B allows two exits from Pioneer Street and will not create access issues for the house on the NE corner of Pioneer and 9th Streets. On the other hand, it would cut off access for the house at the end of 9th Street unless a ramp or other method of passing was established. Since 9th

Street rises noticeably going eastward from Pioneer Street, the distance these baskets rise along 9th Street will determine their effectiveness.

It is likely that Pioneer Street work would only require what is known as a desk jurisdictional determination to decide if it is considered to be outside of the “active channel” of the Santa Maria River and above the ordinary high water mark (OHWM). There is a good chance that the assessment will show that no permitting is necessary under Section 404 of the Clean Water Act, and the jurisdictional determination would be relatively quick when compared to a permit.

A cost estimate for the Pioneer Street HESCO baskets is being provided in .xlsx format with this report and applies to either alignment, as both require a very similar total number of baskets. A four foot high barrier is recommended solely based on the estimated height of water from Guadalupe’s Police Chief.



Figure 7. Pioneer Street HESCO Alignment Options A (left) and B (right)

