Valley Creek Feasibility Study, Bessemer and Birmingham, Alabama

Appendix G:
Clean Water Act Section 404(b)(1) Evaluation
June 2021

US Army Corps of Engineers ®
Kansas City District

Section 404(b)(1) Evaluation for
Valley Creek Flood Risk Management Feasibility Study
Jefferson County, Alabama

I. PROJECT DESCRIPTION

a. Location. The project (Proposed Action) is located at two locations along Valley Creek in Birmingham, Alabama (Figure 1). Detention basin 1 (VD1) is located on the left overbank downstream of Center Street. Detention basin 2 (VD2) is located on the left overbank downstream of Princeton Parkway.

b. General Description: The project includes construction of two overbank detention basins each with an inlet weir, containment berm, and outlet structure. Recreation features are included in the conceptual plan. VD1 comprises approximately 10.0 acres on the left overbank of Valley Creek downstream of Center Street. There is one home on the property and minor roadways. Figures 2 and 3 display a general grading plan and associated profile and section, respectively. VD2 comprises 19.8 acres on left overbank downstream of Princeton Parkway. The area includes three homes and minor roadways. Figures 4 and 5 display a general grading plan and associated profile and section, respectively.

Site preparation includes clearing, grubbing, and stripping at each area. Each site consists primarily of grasses, shrubs, and trees. Approximately 2.1 acres of clearing and grubbing and 7.1 acres of stripping would be required at VD1. Approximately 4.7 acres of clearing and grubbing and 14.2 acres of stripping would be required at VD2. Demolition and removal of structures and pavement would be required as necessary.

Following site preparation, the basins would be excavated, and soil hauled to the containment berm locations for placement and compaction or hauled to a designated disposal location. Excavation will be to a desired elevation to maximize depth and storage volume as well as provide appropriate slope to allow the basin to naturally drain by gravity. It is anticipated all excavation can be achieved prior to encountering bedrock. It is assumed there is sufficient quantity of suitable material for building the containment berm on-site based on the volume of material excavated compared to the volume of material required for the containment berm. Containment berms would follow the perimeter of the basin and range in height from 2-feet to 6-feet depending on the existing ground elevation. Top width is currently 10-foot wide with aggregate surfacing.

The quantities for all sites are based on 1:2 (V:H) side slopes, and bottom grading at 0.5% to allow for gravity drainage to the discharge inlet located

near the downstream extent of each site. With these side slopes, the sites will need armoring for erosion protection on both channel and detention sides of their embankments. Armoring is based on the surface area of the embankments (or berms) for each. The armoring suggested is of the articulated concrete block (ACB) or articulated concrete mat (ACM) type. Some manufacturers include FLexamat® (Ohio), Waskey (Louisiana), and Contech® (national with plant locations in Alabama). Though the berms will be armored, some grass will grow in the interstitial of the ACB/ACM.

Additional armoring would be needed at the outlet toe of the spillway for each site. The volume of stone required for outlet toe protection at each site was based on a common assumption of a set width (away from toe) of 10 feet, a set depth of 4 feet (2 layers), and a unique (per site) spillway length, although many of these lengths are equivalent between sites. The stone applicable for these sites (based on overtopping velocities at the spillway) is Alabama Department of Transportation (ALDOT) Class V riprap (D50 = 1000 pounds). This stone will need to be choked with a smaller size, likely a Class II. Filter material required for appropriate grading is also included in the plan. This would be in the form of a poorly graded gravel layer, topped with an AASHTO #57 stone or similar. A filter fabric may also be required below the base (filter) layer. Tables 1 and 2 summarize earthwork and armoring at each detention area. In Table 1, total cut is the estimated amount excavated for the detention basin and the fill is the amount that would be placed for the containment berm.

Table 1. Earthwork Summary

Detention Basin	Total Cut (yd^3)	Total Fill (yd^3)
VD1	99,000	6200
VD2	227,000	7400

Table 2. Detention Basin and Containment Berm Armoring Summary.

Detention Basin	Armor Area (ft^2)	Class V Toe (yd^3)	Class II Choke Stone (yd^3)	Toe Filter (yd^3)	Spillway Length (feet)
VD1	119,000	297	75	75	200
VD2	198,000	297	75	75	200

Outlet structures are assumed to be 36-inch reinforced concrete pipe culverts. Other types of culverts could be employed if needed based on site constraints. Additional protection at the inlets and outlets of these features is required, approximately 100 cubic yards for each culvert (both upstream and downstream protection included). Alabama DOT Class II riprap will be suitable for this application based on culvert outflow expectations.

c. Authority and Purpose. The feasibility study was authorized by House Resolution Docket 2477 Village Creek, Jefferson County, Alabama, adopted March 7, 1996 by the Committee on Transportation and Infrastructure. The purpose of the proposed action is to improve life safety and reduce economic damages in the study area. Risks to life and property have been identified in the watershed. Repeated economic damages and threat to life safety result in economic inefficiencies that result in losses to the national economy.

d. General Description of Fill Material. Fill associated with the containment berm would consist of soil material excavated from within the footprint of each detention area. Fill used at the outlet structures would consist of ALDOT Class V riprap (D50 = 1000 pounds). This stone would need to be choked with a smaller size, likely a Class II. Filter material required for appropriate grading is also included in the plan. This would be in the form of a poorly graded gravel layer, topped with an AASHTO #57 stone or similar. Quantities are shown in Tables 1 and 2. Riprap would be selected from a commercial quarry in the region.

e. Description of Proposed Discharge Site.

(1) Location. Discharge into Waters of the U.S. associated with the project is anticipated to occur at the inlet weir and outlet structures to Valley Creek for each detention area. All other work at VD1 and VD 2 would not occur in Waters of the U.S.
(2) Size. Inlet weir armoring is described in Table 2. The two outlet structures range in size from 140 to 240 feet and each is anticipated to require 100 yd^3 of riprap armoring.
(3) Type of Site. The inlet weir armoring and outlet culvert with associated riprap would occur in the streambank of Valley Creek.

(4) Type of Habitat. Habitat types affected would be riparian area of streambank. The streambank consists of woody vegetation or shrubs.
(5) Timing and Duration of Discharge. The placement of inlet weir armoring, culvert, riprap protection, and containment berm would be permanent.

f. Description of Disposal Method. Riprap would be placed using mechanical construction equipment.

II. FACTUAL DETERMINATIONS

a. Physical Substrate Determinations.

(1) Substrate Elevation and Slope. Substrate of Valley Creek would not change. Excavation for culvert installation or spillway is not anticipated to extend to the stream bed.

(2) Sediment Type. No change to type of substrate sediment is anticipated. Natural streambank material would be replaced with riprap at the outlet locations; however, as stated this is not anticipated to affect substrate.

(3) Dredged/Fill Material Movement. It is possible that riprap could become dislodged and moved during high flow events over the life of the project, and this would be addressed by operations and maintenance of the project.

(4) Physical Effects on the Benthos. Construction activity and placement of riprap would have potential to crush benthic species. Riprap would replace existing material at the outlet location.

(5) Actions Taken to Minimize Impacts. Construction Best Management Practices and an Erosion, Sediment, and Pollution Control Plan will be implemented to contain potential increased turbidity resulting from the disposal and construction.

b. Water Column Determinations

(1) Salinity. Not applicable

(2) Water Chemistry. Water chemistry is not expected to be impacted.

(3) Clarity. Water clarity may be temporarily decreased in the vicinity of construction activities. These impacts would subside once construction is completed.

(4) Color. Impacts to water color are not anticipated.

(5) Taste. Taste is not anticipated to be affected by the project.

(6) Dissolved Gas Levels. Dissolved gas levels are not anticipated to be affected by the project.

(7) Nutrients. Nutrient levels are not anticipated to be affected by the project.

(8) Eutrophication. Eutrophication is not anticipated to be affected by the project.

c. Water Circulation, Fluctuation, and Salinity Gradient Determinations

(1) Current Patterns and Circulation

a. Current Patterns and Flow. The project is designed to allow flood flows to enter the detention basins to reduce water surface elevations during flood events. Current patterns and circulation would not be affected during normal flows.

b. Velocity. No substantial changes to velocity are anticipated.

(2) Stratification. There would be no impacts to water stratification.

(3) Hydrologic Regime. The project is designed to allow flood flows to enter the detention basins to reduce water surface elevations during flood events.

(4) Normal Water Level Fluctuations. The project is designed to allow flood flows to enter the detention basins to reduce water surface elevations during flood events.

(5) Salinity Gradients. Not applicable.

d. Suspended Particulate/Turbidity Determinants.

(1) Expected Changes in Suspended Particulate and Turbidity Levels in Vicinity of Disposal Sites. A temporary increase in suspended particulates and turbidity levels would occur in the immediate vicinity of the outlet construction zone. These impacts would be temporary and subside at completion of construction.

(2) Effects on Chemical and Physical Properties of the Water Column.

a. Light penetration. Increases in suspended solids would be negligible and temporary. Impacts to light penetration are not anticipated.

b. Dissolved oxygen. No effects to dissolved oxygen are anticipated from the project.

c. Toxic Metals and Organics. No effects are anticipated from the project.

d. Pathogens. No effects are anticipated from the project.

e. Aesthetics. The immediate vicinity of the outlet structures would change from a more natural stream bank to that of riprap and a concrete pipe. Change to aesthetics within the detention basins would be to open vegetated areas surrounded by recreational trails.

(3) Effects on biota.

a. Primary Production, Photosynthesis. Temporary, localize impacts may occur during construction but would be negligible.

b. Suspension/Filter Feeders. Temporary, localize impacts may occur during construction but would be negligible.

c. Sight feeders. No impacts to sight feeders are anticipated from the project.

(4) Actions taken to Minimize Impacts. Construction Best Management Practices and an Erosion, Sediment, and Pollution Control Plan would be implemented to minimize impacts.

e. Contaminant Determinations. A Phase 1 HTRW assessment was performed to identify the potential for such issues to be present within the footprint of the project. VD1 has an unknown risk associated with the Twin City Clarage Inc facility located across the street from this proposed detention basin. Three borings were conducted at VD1 and terminated at depths between 7 and 8 feet. In one boring, groundwater was encountered at a depth of 7.2 feet. Excavation to groundwater is not intended for the detention basins; however, if excavation was to extend below the water table, the potential for encountering contamination cannot be ruled out at this time. Further evaluation would occur during the design phase and if potential for contamination exists, appropriate mitigation would be implemented to prevent the possibility of contamination entering Valley Creek. The riprap and culvert that would be placed would be free of contaminants.

f. Aquatic Ecosystem and Organism Determinations.

(1) Effects on plankton. Any effects to plankton would be negligible and temporary during construction.

(2) Effects on Benthos. Benthic organisms within the construction zone would be crushed underneath riprap placement. Adjacent benthic communities would be indirectly impacted from increased turbidity. No significant impacts would result from this project.

(3) Effects on Nekton. Nektonic species are expected to be temporarily affected during disposal and construction and may evacuate the immediate vicinity; however, they are expected to return once turbidity

levels return to pre-project conditions. No significant impacts are expected.

(4) Effects on Aquatic Food Web. This project would not affect the aquatic food web.

(5) Effects on Special Aquatic Sites.

a. Sanctuaries and Refuges. None in project area, therefore, not effects.

b. Wetlands. No wetlands would be impacted by the project.

c. Mud Flats. No mud flats would be impacted by the project.

d. Vegetated Shallows. No vegetated shallows would be impacted by the project.

e. Coral Reefs. Not applicable.

f. Riffle and Pool Complexes. No riffle and pool complexes would be impacted by the project.

(6) Threatened and Endangered Species. USACE has coordinated with the USFWS regarding potential for federally listed species in the project area. USACE would limit tree clearing for the project to occur from October 15 to March 31 to avoid impacts to spring/summer roosting and maternity colonies of the Indiana bat and northern long-eared bat, as recommended by the USFWS.

(7) Other Wildlife. Wildlife would experience a loss of habitat as a result of the project from construction of detention basins. Those impacts are primarily from loss of tree cover/forest in the footprint of the detention basins. USACE would mitigate these impacts through tree planting elsewhere in the study area. Wildlife would be displaced by the loss of habitat and by construction-related disturbance. However, wildlife present in the study area are common species adaptable to urban environments. As a result, these long- and short-term adverse impacts to wildlife would be considered small. Detention basins would provide wildlife habitat following construction because the areas would be re-vegetated with native species.

(8) Actions to Minimize Impacts. Impacts to species were minimized by avoiding impacts to habitat to the extent possible.

g. Proposed Fill Site Determination.

(1) Mixing Zone Determination. This activity does not require a mixing zone determination. The nature of the construction activities and constituent concentrations preclude the need for a mixing zone determination.

(2) Determination of Compliance with Applicable Water Quality Standards. The proposed action will comply with applicable water quality standards as established by the Alabama Department of Environmental Management (ADEM). USACE would obtain a Section 401 water quality certification (WQC) from ADEM prior to construction and adhere to any conditions of that 401 WQC.

(3) Potential Effects on Human Use Characteristics.

a. Municipal and Private Water Supply. This project would not affect municipal or private water supplies.

b. Recreation and Commercial Fisheries. This project would not affect recreation or commercial fisheries.

c. Water Related Recreation. This project would not affect water related recreation.

d. Aesthetics. The immediate vicinity of the outlet structures would change from a more natural stream bank to that of riprap and a concrete pipe. Change to aesthetics within the detention basins would be to open vegetated areas surrounded by recreational trails.

e. Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves. No such resources are anticipated to be affected by the project.

f. Other Effects. Not Applicable

(4) Determination of Cumulative Effects on the Aquatic Ecosystem. The impacts of the proposed action would be minor and temporary and, therefore, would not contribute to adverse cumulative impacts.

(5) Determination of Secondary Effects on the Aquatic Ecosystem. Secondary effects to the aquatic ecosystem would likely be beneficial from a reduction of contaminants entering Valley Creek due to flood waters holding that water in the detention areas. The aquatic ecosystem in Valley Creek under the existing condition is degraded.

III. FINDINGS OF COMPLIANCE OR NONCOMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE.

a. No significant adaptations of the guidelines were made relative to this evaluation.

b. The proposed discharge represents the least environmentally damaging practicable alternative that would accomplish the project objectives.

c. Based on the nature of the fill material, the placement of riprap would be in compliance with applicable state water quality standards. USACE would comply with all conditions of the Section 401 WQC that would be obtained from ADEM prior to construction.

d. The fill material would not violate the Toxic Effluent Standard of Section 307 of the Clean Water Act.

e. The placement of fill material would not jeopardize the continued existence of any Federally listed endangered or threatened species or their critical habitat.

f. The proposed discharge of fill material would not contribute to significant degradation of waters of the United States. Nor would it result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing; life stages of organisms dependent upon the aquatic ecosystem; ecosystem diversity, productivity and stability; or recreational, aesthetic or economic values.

g. Appropriate and practicable steps to minimize potential adverse impacts of the discharge on the aquatic ecosystem have been incorporated into project plans.

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Figure 1. Location of Off Channel Detention Areas in Birmingham, AL.

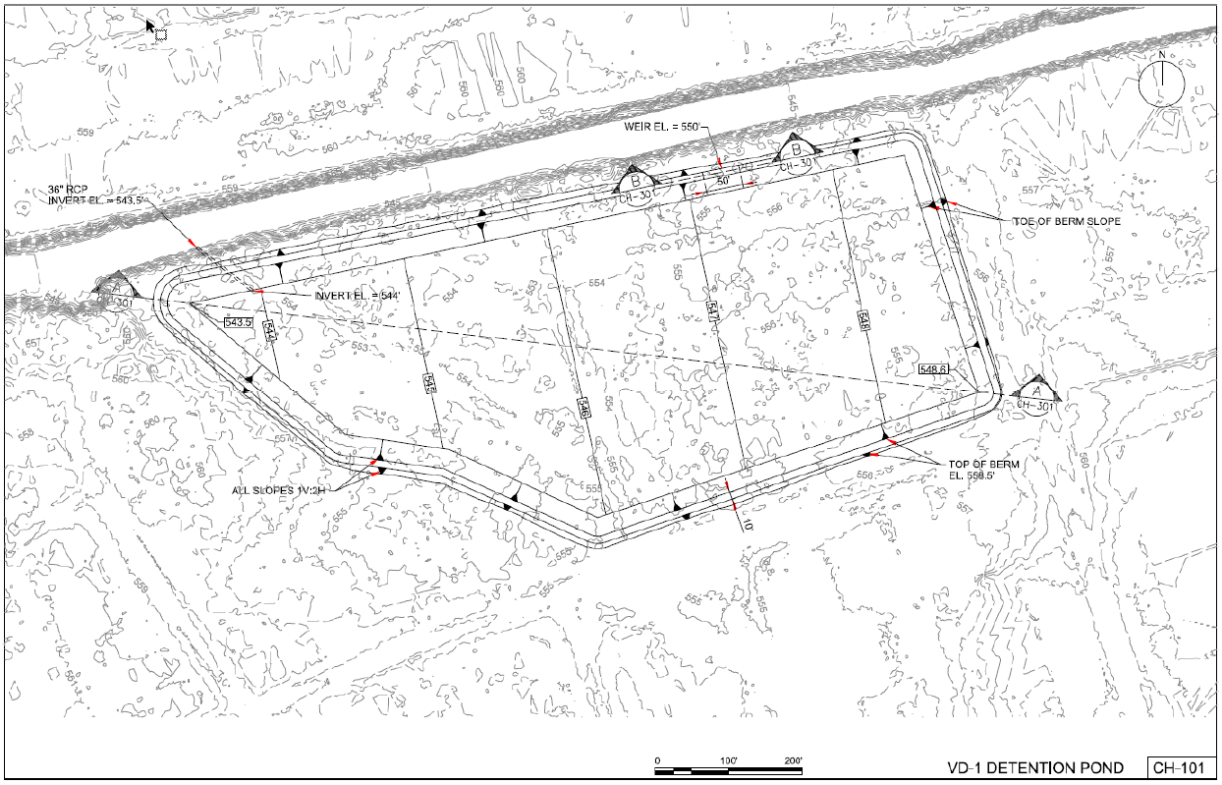

Figure 2. Conceptual plan of Overbank Detention Basin VD1

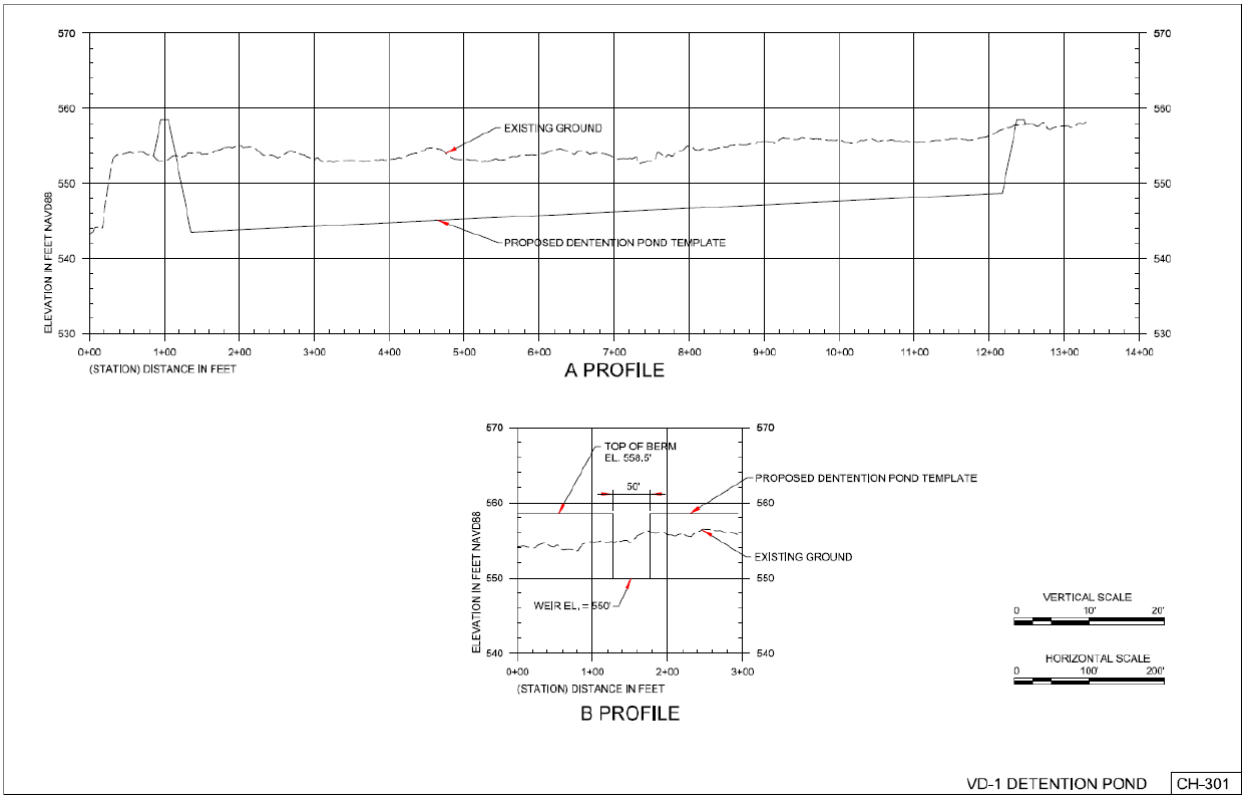

Figure 3. Conceptual Profile and Section Detail of Basin and Lateral Inflow Weir at VD1

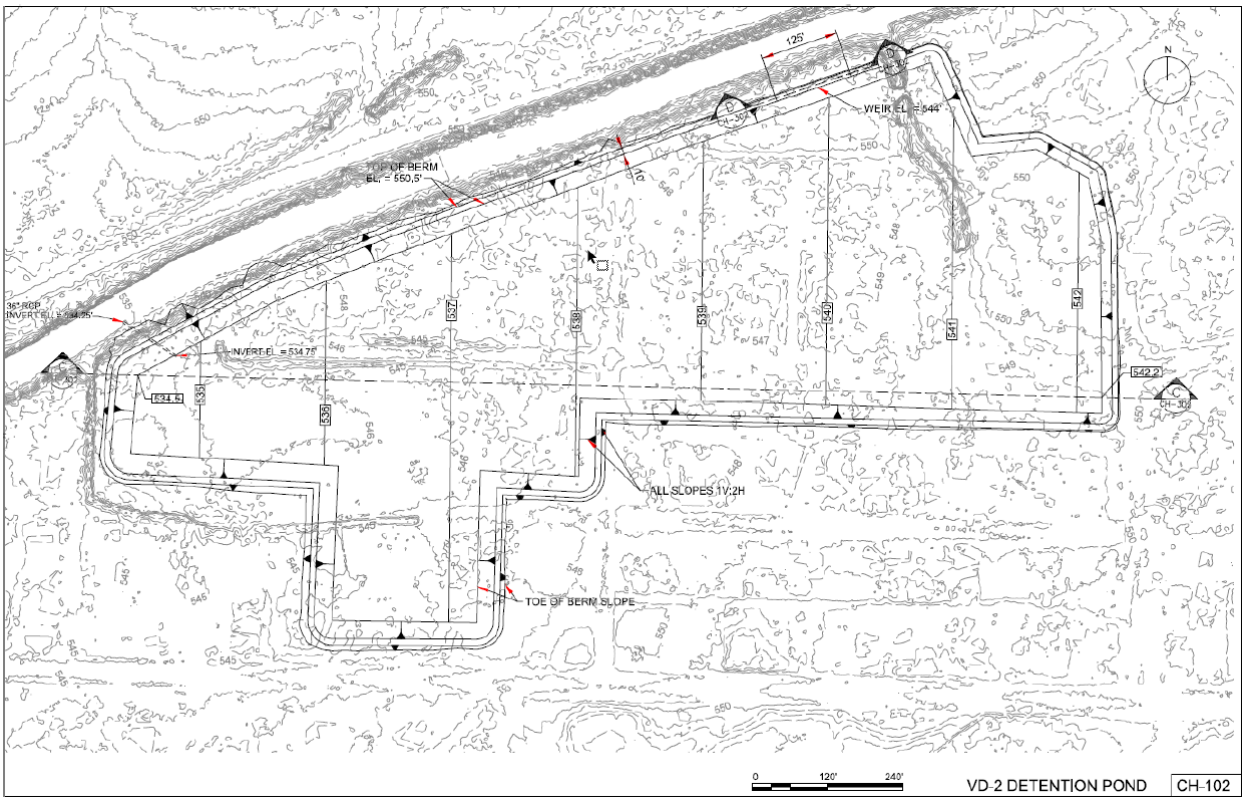

Figure 4. Conceptual plan of Overbank Detention Basin VD2

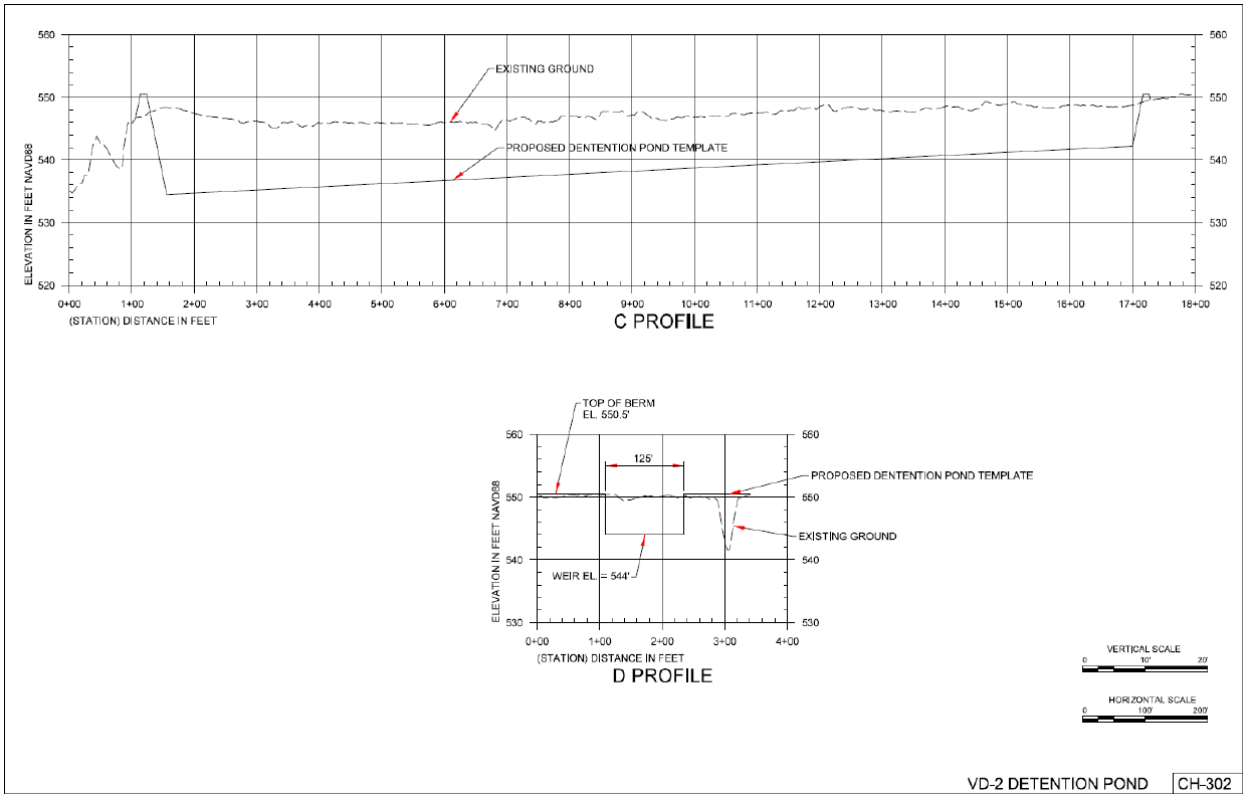

Figure 5. Conceptual Profile and Section Detail of Basin and Lateral Inflow Weir at VD1