Gungadin Drive Erosion Mitigation

Concept Design Report

Stantec

Prepared for:
Anderson Township, Ohio

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Date:
January 22, 2026

Project/File:
173411172

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Revision Record

Revision	Description	Author	Date	Quality Check	Date	Independent Review	Date
A	DRAFT	N. Krebs S. Lee	11/21/2025	J. Scheibly	11/24/2025	J. Moyer	11/25/2025
B	DRAFT REVISED	N. Krebs S. Lee	1/5/2026	J. Scheibly	1/6/2026	R. Lopina	1/6/2026
C	FINAL	N. Krebs	1/21/2026	J. Scheibly	1/6/2026	R. Lopina	1/22/2026

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Executive Summary

This document is a concept design report prepared by Stantec Consulting Services Inc. for Anderson Township, Ohio, to develop concept design alternatives that address erosion mitigation along an unnamed tributary of Clough Creek near Gungadin Drive. This report outlines the background, problem understanding, site visit findings, drivers of instability, conceptual alternatives, permitting considerations, and recommended next steps for the project.

Stantec was contracted to develop conceptual alternatives to address bank erosion concerns expressed by residents along the tributary near Gungadin Drive. Residents reported significant loss of backyard space, damage to trees and fencing, concerns about structural stability of homes, and increased flood risk during heavy rains. Many had attempted individual mitigation measures, often with limited success. The area of concern was identified between approximately 7257 to 7268 Gungadin Drive, confirmed by a site visit on October 31, 2025.

During the site visit, erosion was observed on both stream banks, worsening toward the west end of Gungadin Drive. The south bank exhibited steep slopes with severe erosion and downed trees. Various retaining walls of differing materials and conditions were noted on the north bank. A notched low-head dam with a failed concrete apron was found near 7254 to 7268 Gungadin Drive, contributing to pedestrian crossing failure, accelerated south bank erosion, and undermining of retaining walls. Primary drivers of channel instability were determined to be valley confinement and floodplain constriction and modification and failure of the existing low head dam.

Three planning-level alternatives were developed considering site constraints such as limited construction access and existing utilities. These were: 1) rebuilding failed retaining walls, demolishing the dam, and targeted stream restoration, 2) retrofitting the dam with a stilling basin and rebuilding failed retaining walls, and 3) rebuilding the walls with no in-channel work. Based on likely performance, construction cost, permitting burden, and potential for future maintenance, further evaluation of the first two alternatives is recommended.

1 Background

1.1 Project Site

The project site is shown in Figure 1. An unknown tributary of Clough Creek flows east to west, generally parallel with Gungadin Drive. The primary focus area for this project is located near the west end of Gungadin Drive.

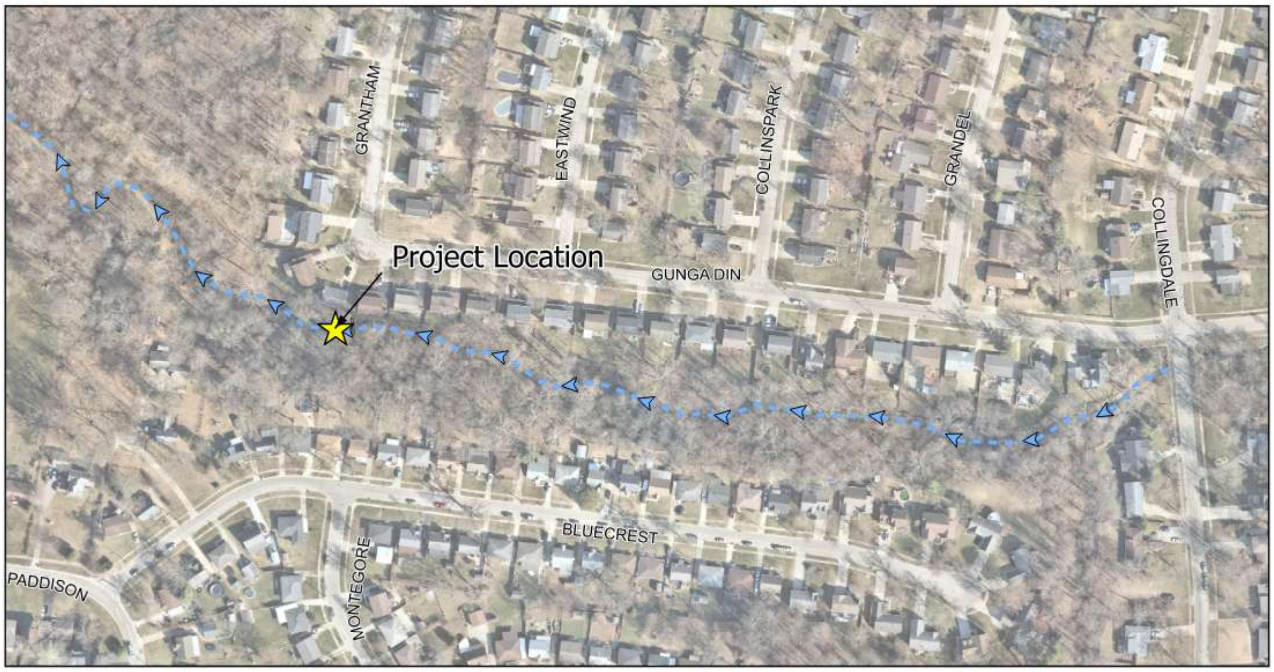


Figure 1. Project site overview

1.2 Problem Understanding

Stantec was contracted by Anderson Township to develop conceptual alternatives to address the observed bank erosion along an unnamed tributary of Clough Creek near Gungadin Drive. To better understand the issues associated with stream and bank instability, Stantec reviewed residents' concerns and conducted a site visit to document existing conditions. Both items played a critical role in shaping our understanding of the issues associated with the stream. This information allowed Stantec to better define the scope and urgency of the problem. The residents' concerns, site observation of existing conditions, and the drivers of instability are discussed below.

1.2.1 Resident Concerns

Following the kickoff of this project, Anderson Township sent letters to residents/property owners. The purpose of this letter was to give an overview of the project and to solicit information on issues that have been observed. Responses to this letter were provided to and reviewed by Stantec, with primary concerns summarized below.

The responses from the residents expressed concerns about the ongoing erosion of the stream banks adjacent to their properties. Many have witnessed the loss of usable backyard space, with some reporting that substantial portions of their yards have been lost to bank erosion, as well as loss of trees and fencing. Erosion is also viewed as a risk to the safety and stability of homes, as some residents believe structural concerns with their foundations are related to the stream bank erosion. Flood risk is another common issue, with some describing the creek “transforming from a trickle to a rushing river” during heavy rains, which they believe is exacerbating the erosion and increasing the risk of hillslope failures. In response to these concerns, several residents have attempted individual mitigation measures, such as planting ground cover or installing retaining walls, but these efforts have often proven ineffective or only temporarily successful.

Beyond the immediate physical impacts, residents are concerned about declining property values and the potential for damage to utilities like water and sewer lines and overhead utilities that run near the stream. There is also concern for the safety of children and pets, as unstable banks and fallen trees pose safety hazards. The community has voiced a strong desire for a coordinated, engineered solution rather than piecemeal approaches, emphasizing the need for functional, durable interventions stabilize both sides of the creek and restore lost land, if possible. Some residents have suggested features such as access points for crossing the creek and adequate retaining walls to contain future flood events. Overall, the correspondence reveals a neighborhood eager to collaborate with local authorities and consultants to develop a long-term solution that addresses both the environmental and personal impacts of bank erosion. Based upon review of resident concerns and input from the township, the area of concern was identified as the reach located from approximately 7257 to 7268 Gungadin Drive.

1.2.2 Site Visit

Stantec confirmed the extents of erosion during a site visit with an Anderson Township representative October 31, 2025. The site visit included walking the stream that runs parallel to Gungadin Drive from Collingdale Avenue to the west end of Gungadin Drive. Stantec took photographs and notes, made observations related to the stream erosion and potential construction access, and spoke to several homeowners regarding the issues they have observed. Based on those conversations and review of feedback discussed in Section 1.2.1, the homeowners’ two primary concerns included progressive erosion encroaching into their backyards on the north stream bank and the potential for trees to fall on the south stream bank, resulting in a financial burden by either blocking stream flow or destruction of property through increased localized erosion.

Appendix A provides an overview of the site visit and select photos. Erosion was observed on both banks of the stream, increasing in severity toward the west end of Gungadin Drive. The slope above the south bank was observed as steep, with several areas showing severe erosion and downed trees, apparently due to progressive slope degradation. Several retaining walls were observed along the north bank, including block, concrete bag, natural stone, and gabion baskets. These walls were in various states of condition, ranging from failed to good condition.

In the same location as the various retaining walls (approximately 7254 to 7268 Gungadin Drive), an existing notched low-head dam with a failed concrete apron were observed (Photo 3, Appendix A). The notched dam and failed concrete apron have led to the failure of a private pedestrian crossing, accelerated erosion of the south bank, and undermining of a retaining wall (Photo 5, Appendix A).

1.2.3 Drivers of Instability

Streams exist in a state of dynamic equilibrium, where the forces driving stream morphology and behavior (for example, sediment supply, flow regime, watershed land use and landcover) determine cross sectional area, profile slope, and planform. For stable streams (i.e., those that are not actively eroding, depositing excess sediment, or rapidly changing), these driving forces are in a net balance (Figure 2).

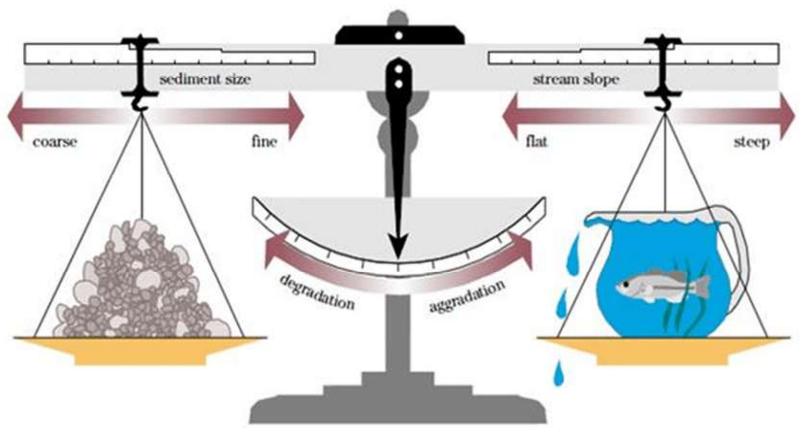
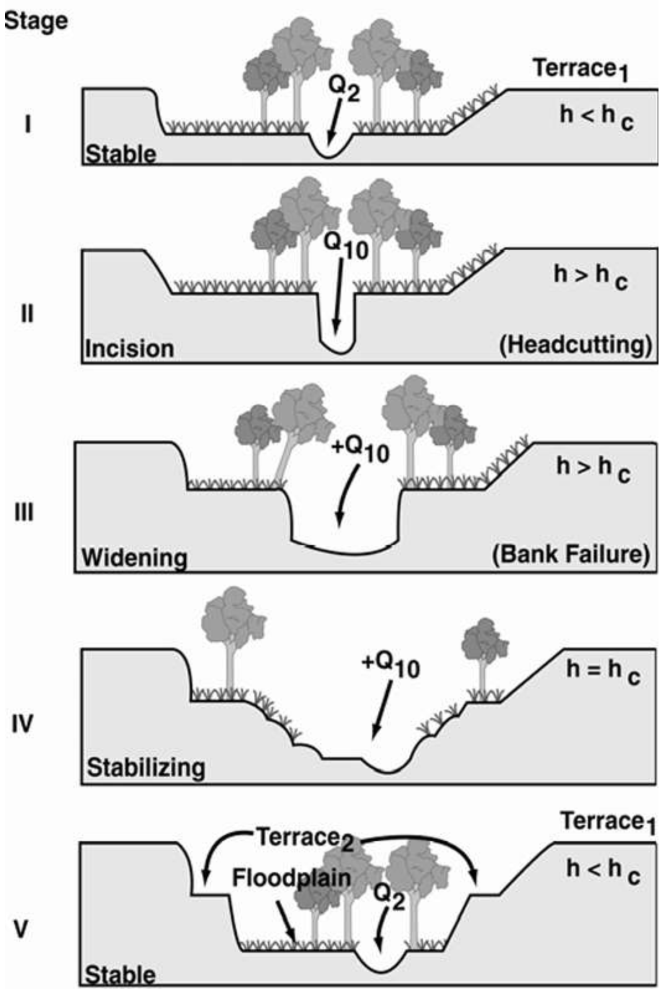


Figure 2. Lane's conceptual model of stream dynamic equilibrium (from Rosgen 1996)

Unstable streams have been shifted out of this equilibrium state and follow a typical progression of changes until a new balance of forces is attained (Figure 3).



Stage 1 – Stream is stable and is in dynamic equilibrium.

Stage 2 – Disequilibrium has begun due to a change in driving forces, and erosion downcutting of the stream bed begins to return to dynamic equilibrium.

Stage 3 – Increased bank height from downcutting leads to bank instability and collapse. Erosion and sediment export continue until stream power is reduced.

Stage 4 – Bank heights lower and excess sedimentation overwhelms stream sediment transport capacity. Vegetation establishes and stabilizes banks, and a new low-flow channel forms.

Stage 5 – Dynamic equilibrium is restored with development of a new floodplain. Abandoned floodplain remains as a terrace feature.

Figure 3. Simplified channel evolution model (from Zaimes and Emanuel, 2006)

The stream adjacent to Gungadin Drive is in a disequilibrium state, and erosion observed within the area of concern is the result of channel evolution towards a new steady state. Preliminary examination suggests it is in Stage III of the model shown in Figure 3, typified by channel widening and bank failures (Figure 4).

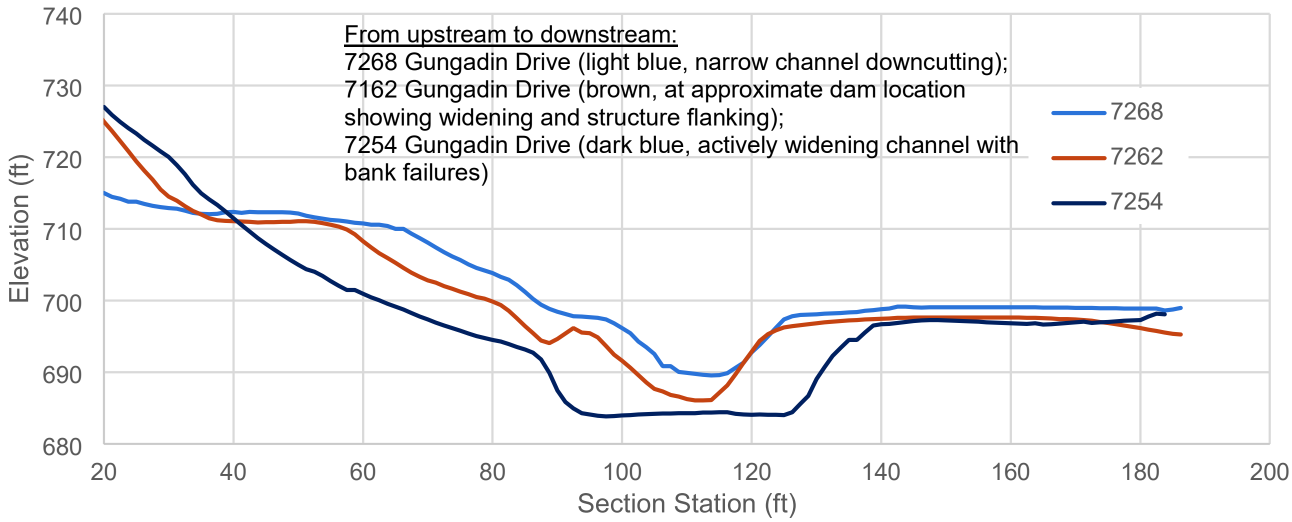


Figure 4. Channel sections cut from DEM data

Identifying the drivers of instability along the area of concern allows for the development of alternatives that address the causes of erosion and allow designs focused on equilibrium of the channel; these are likely to be more sustainable in the long term and require less maintenance in the future.

Based upon the observations of the site visit, two primary drivers of instability were identified:

1. Valley confinement and channel incision
2. Low-head dam apron failure

Valley confinement and channel incision have substantial effects on stream stability due to excess shear stress on the bank from concentration of flow energy in the stream channel. Stable channels typically have access to a floodplain to disperse flows, regulate depth, and reduce stream power and resulting erosion. The flood prone width (Figure 5) defines this active floodplain, and constriction of this area concentrates flows and increases erosion risk.

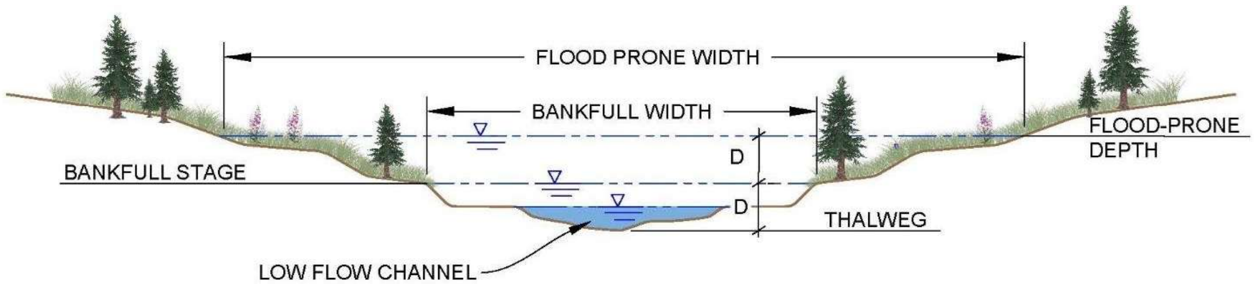


Figure 5. Critical stream geomorphic zone extents and elevations (from USFWS 2024)

The first identified driver of instability within the area of concern is the confinement of the open channel's floodplain due to valley constriction. Man-made constrictions from suburban developments are present on both sides of the stream. The floodplain encroachment on the north side of the stream is assumed to be from development, but could also be the natural, pre-development. topography. Due to the various retaining walls, it was difficult to determine if the topography of backyards is the result of fill placed during development or native, pre-disturbance soils. These developments and constrictions result in stream entrenchment. The stream is also cut off from the floodplain in most of the studied section, especially in the areas where the retaining walls constrict the channel (7254 to 7268 Gungadin Drive).

The second driver of instability is the low-head dam and failing concrete apron. The low-head dam was notched (Photo 3, Appendix A), for unknown reasons. With no dissipation pool or stilling basin downstream, flows are concentrated through the notch. Excess energy and turbulence in this area and the left (south) bank have eroded approximately 10 feet of bank at the edge of the concrete apron. This has led to the failure of a private pedestrian crossing (Photo 3, Appendix A) and the undermining of the concrete apron (Photo 4, Appendix A). Additionally, the loss of the toe of the valley slope on the south bank has resulted in bank failures and large trees falling into and across the channel. The scour hole that formed at the outlet of the apron undermined the toe of the concrete bag retaining wall, (Photo 5, Appendix A), leading to the collapse of the wall in that section.

2 Conceptual Alternatives

Three planning-level alternatives were developed to improve streambank stability while considering site constraints. There were two primary site constraints that were considered when developing the alternatives which were construction access and existing utilities. Construction access will be difficult because the site must be accessed between houses on Gungadin Drive. The spacing between houses is narrow and the use of large construction equipment may be difficult or impossible. Therefore, the alternatives that are presented can be constructed with small construction equipment such as compact track loaders (example CAT 255) and mini excavators (example CAT 308 series).

The second site constraint is existing utilities. The first utility is the stormwater outfall located downstream of the low-head dam which has been integrated into the concrete bag retaining wall and concrete apron. The invert of this outfall is approximately 1 foot below the invert of the notch in the low-head dam. This outfall must remain open to maintain a similar conveyance capacity as existing conditions to not adversely affect flooding in the watershed associated with the outfall. The other existing utilities are the various overhead lines and poles running along the back yards of the north bank, which could require relocation for equipment access to the site.

Alternatives were developed to address the drivers of instability described above. These were focused on energy dissipation and stabilizing critical stream features. Fully rectifying floodplain encroachment would only be possible by reconnecting the stream to a floodplain, which would require the acquisition of the parcels associated with addresses 7254 to 7268 Gungadin Drive for the floodplain width required and excavation of a floodplain due to previous channel downcutting. Acquisitions of these parcels was considered infeasible; therefore, bank stabilization, instream grade control, and structure rehabilitation were the primary approaches examined.

2.1 Alternative 1

2.1.1 Approach

Alternative 1 (Figure 6) looks to establish geomorphic stability for the stream and reduce risk of further bank erosion. Primary elements include:

1. Demolition of existing low-head dam and apron. Removal of the dam decreases the slope of the stream and will reduce the energy of the channel flows, reducing the risk of erosion at the dam location. Decreasing the slope of the stream also reduces the possibility of lateral migration.

2. Construction of a series of cross vanes and rock riffles. These structures will step down the hydraulic drop from the dam over a series of structures, spreading the large drop associated with the current dam across multiple locations and dissipating energy in the reach. These features also create instream aquatic habitat.

3. Construction of a retaining wall along properties 7254 to 7268 Gungadin Drive. This structure will replace failed wall sections and create a unified barrier to stream erosion.

4. Removal of large trees on the south bank. This action will reduce risk of potential bank failures that would result from root upheaval as well as eliminate potential debris jam creation from fallen trunks.

5. Bankfull bench creation and installation of shade tolerant live stakes, plugs, and seed on the south bank. This would rebuild and reinforce the south bank, restore channel dimensions from their current over-widened state, and improve riparian zone ecological function.

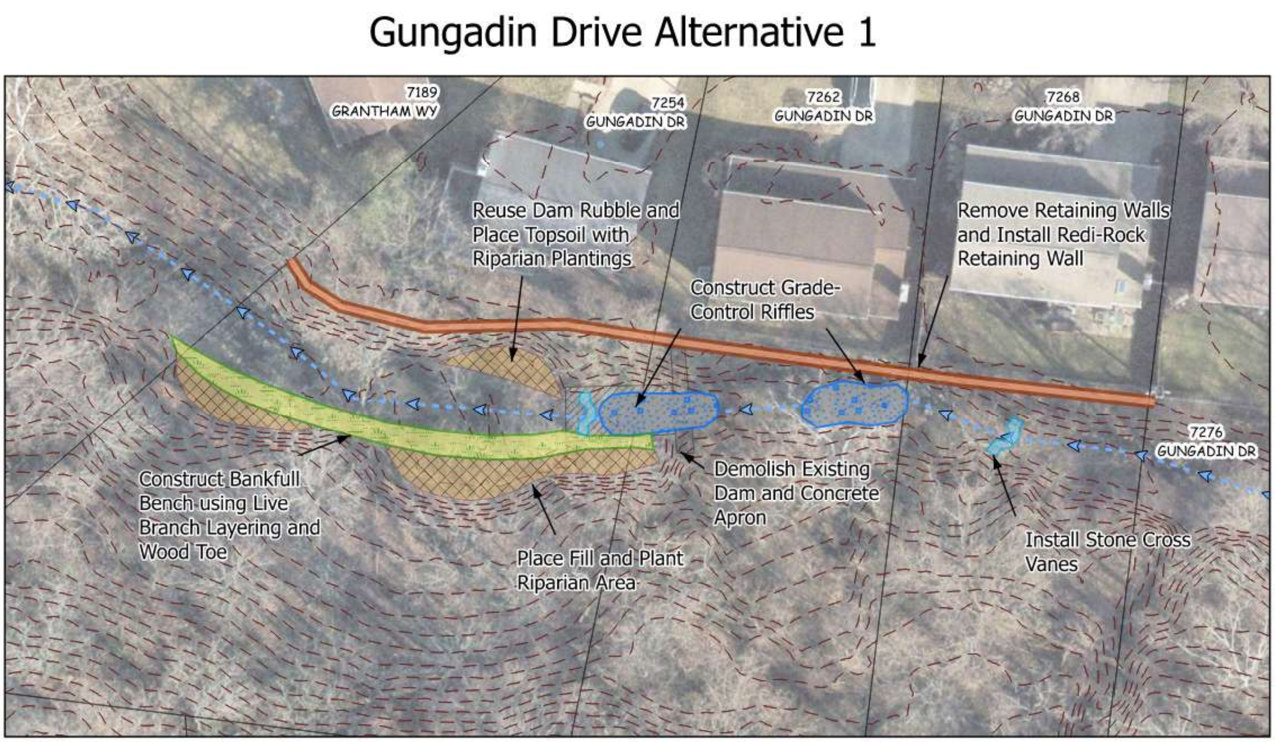


Figure 6. Schematic of Alternative 1

2.1.2 Opinion of Probable Construction Cost

Detailed design of this alternative will be necessary to determine the rock size required for the cross vane and rock riffles. This design requires rock which is above the "threshold" size of the channel, meaning it cannot be moved by flows in the stream. It may be determined that the threshold size of rock required cannot be installed due to site constraints. However, a planning level opinion of cost (assuming threshold sized rock can be installed) is provided below for comparison to other alternatives.

Alternative 1 - Nature Based Construction + Retaining Wall

Component	Unit	Quantity	Unit Cost	Total Cost
Construction Stake Out	LS	1	$5,000	$5,000
Clearing & Grubbing	AC	0.25	$10,000	$2,500
Erosion and Sediment Control	MO	5	$2,000	$10,000
Demolish Existing Concrete Dam and Apron	LS	1	$30,000	$30,000
Demolish Existing Retaining Wall	LS	1	$30,000	$30,000
Gravity Retaining Wall	SF	1,650	$70	$115,500
Riffle Material	TON	800	$80	$64,000
Bank Stabilization Fill	TON	810	$80	$64,800
Live Branch Layering	LF	125	$160	$20,000
Brushy Toe	LF	125	$225	$28,125
Meadow Seeding + Planting	AC	0.25	$10,000	$2,500
Tree planting	EA	10	$1,500	$15,000
Mobilization/Demobilization	LS	1	$19,400	$19,400
Subtotal				$406,825
General & Overhead			15%	$61,024
Construction Cost Contingency			30%	$122,048
Total				$589,896

2.1.3 Permitting Requirements

Alternatives presented in this Report require authorization under Clean Water Act (CWA) Section 404 from US Army Corps of Engineers (USACE), as well as a CWA Section 401 Water Quality Certification (WQC) from Ohio Environmental Protection Agency (OEPA). These are discussed in the following.

1. USACE NWP: With the improvement of aquatic habitat, Alternative 1 may be eligible for an USACE Nationwide Permit (NWP) under Section 404. These permits are designed for smaller projects with minimal adverse impacts to jurisdictional streams/wetlands and have a less burdensome permitting process with faster review times. NWPs are issued for specific actions, and this alternative may quality for: NWP 27 – Aquatic Habitat Restoration, NWP 13 – Bank Stabilization, or NWP 53 – Removal of Low-Head Dams.

2. Agency Coordination: As a federal action, a CWA permit requires consultation with federal agencies that may have resources adversely affected by the permitted action, including threatened and endangered species with United States Fish and Wildlife Service (USFWS). This is typically streamlined as informal consultation in the NWP process completed by USACE (i.e., will unlikely require any additional Consultant fee).

3. OEPA WQC: 401NWPs have programmatic 401 WQCs included provided they meet regional conditions, and this would likely be the case for Alternatives considered in this Report. A separate application to OEPA is required (in addition to the USACE) and will be coordinated between USACE and OEPA.

4. Additional Permits: Other permits are also noted:

    a. Construction would likely require a General Construction Permit from OEPA for erosion and stormwater pollution prevention (OHC000006). This requires developing Erosion Prevention and Sediment Control Plan Drawings, preparing a written Stormwater Pollution Prevention Plan, and submitting this information as a Notice of Intent to the OEPA.

    b. The stream does not have a mapped floodplain so a Special Flood Hazard Area Permit or Letter of Map Revision from the Federal Emergency Management Agency (FEMA) will not be required. The lack of a regulatory floodplain also likely eliminates the need for authorization from the local Floodplain Manager.

    c. Other local construction and zoning permits may need to be coordinated with the City of Cincinnati or Anderson Township.

2.2 Alternative 2

2.2.1 Approach

This alternative will rehabilitate the existing dam structure without removing it entirely (Figure 7). Includes replacement of the existing concrete apron with a stilling basin and cutoff wall, replacement of the existing concrete bag retaining wall, and repairs/extension to the stacked block retaining wall. These improvements will stabilize the structure and dissipate energy concentrated in the dam notch. The stilling basin will dissipate energy created by the low head dam and likely decrease exit velocity of flows from the structure, reducing erosive forces that have created the large scour hole.

The major components of this alternative include the following:

1. Demolition of the Existing Low-Head Dam Apron. This removes a failed structure and preferential flow path for future erosion and flanking flows that could de-stabilize the site further.

2. Construction of a Stone Stilling Basin. This dissipates the energy of the hydraulic drop from the upstream water elevation to the pool below and reduces velocity as stream flows exit the structure. This reduces erosion risk for the channel bed and adjacent stream banks.

3. Replacement of failed retaining wall adjacent to the dam. This reduces bank erosion risk and risk of downstream wall failures due to stream flanking. The new wall will have footers below the scour depth of the stream.

4. Removal of large trees on the south bank. This action will reduce risk of potential bank failures that would result from root upheaval as well as eliminate potential debris jam creation from fallen trunks.

5. Bankfull bench creation and installation of shade tolerant live stakes, plugs, and seed on the south bank. This would rebuild and reinforce the south bank, restore channel dimensions from their current overwidened state, and improve riparian zone ecological function.

Gungadin Drive Alternative 2

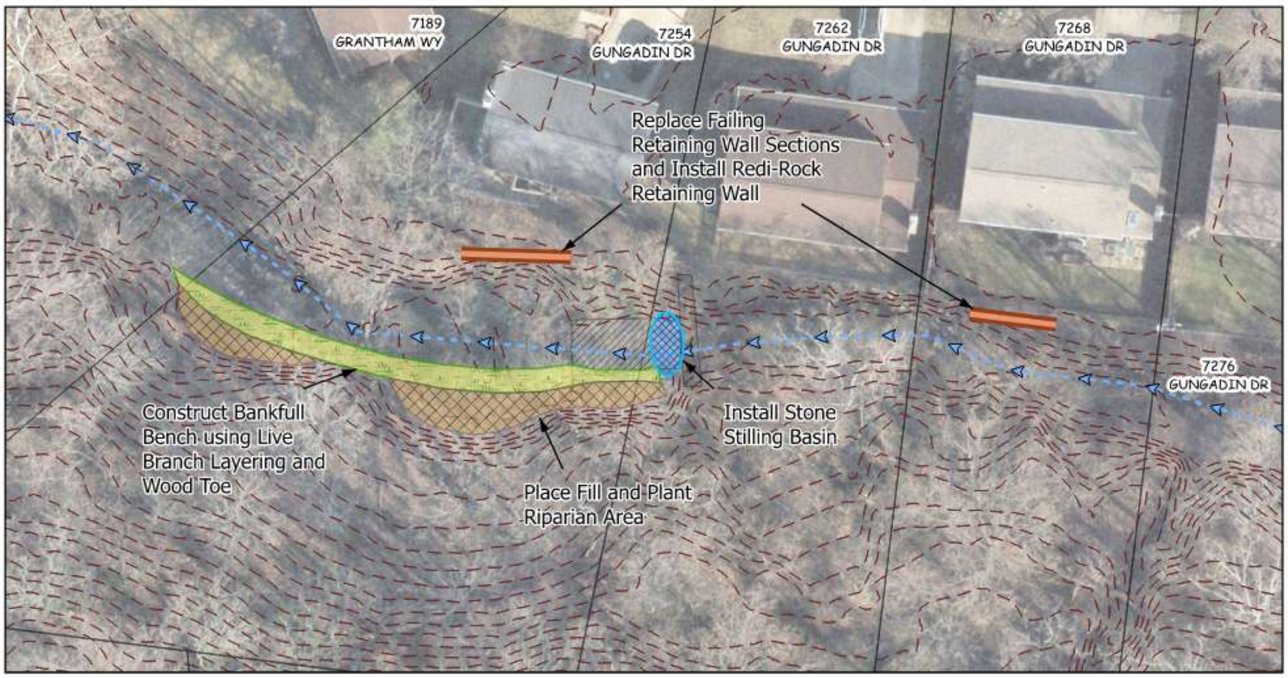


Figure 7. Schematic of Alternative 2

2.2.2 Opinion of Probable Construction Cost

As with Alternative 1, further work evaluating required equipment, channel morphology, structure soundness, and material sizing will be required for development of a full opinion of cost. The opinion of cost below is provided for comparison and planning purposes.

Alternative 2 - Stilling Basin Construction + Retaining Wall

Component	Unit	Quantity	Unit Cost	Total Cost
Construction Stake Out	LS	1	$5,000	$5,000
Clearing & Grubbing	AC	0.25	$10,000	$2,500
Erosion and Sediment Control	MO	5	$2,000	$10,000
Demolish Existing Retaining Wall and Concrete Apron	LS	1	$30,000	$30,000
Gravity Retaining Wall	SF	500	$70	$35,000
Energy Dissipation Stilling Basin	TON	280	$80	$22,400
Bank Stabilization Fill	TON	810	$80	$64,800
Live Branch Layering	LF	125	$160	$20,000
Brushy Toe	LF	125	$225	$28,125
Meadow Seeding + Planting	AC	0.25	$10,000	$2,500
Tree planting	EA	10	$1,500	$15,000
Mobilization/Demobilization	LS	1	$11,800	$11,800
Subtotal				$247,125
General & Overhead			15%	$37,069
Construction Cost Contingency			30%	$74,138
Total				$358,331

2.2.3 Permitting Requirements

1. This alternative is likely to be eligible for authorization under USACE NWP 13 Bank Stabilization. The bankfull bench, plantings, and installation of the stone stilling basin all contribute to remediating and stabilizing the streambanks and are likely to be permitted through NWP 13. It should be noted that NWP 13 has limits to the extent of work (no longer than 500 linear feet) and the volume of material placed below the existing ordinary high-water mark of the stream (no more than 1 cubic foot of fill per running foot of bank).

2. As with Alternative 1, the 401 WQC would likely be issued as part of the NWP, and construction would require a General Construction Permit from OEPA for erosion and stormwater pollution prevention.

2.3 Alternative 3

2.3.1 Approach

The final Alternative proposes no work on the existing dam or channel bed. Erosion risk would be mitigated by construction of a new retaining wall along all the properties within the area of concern (Figure 8), extending it upstream past areas of potential flow impingement and flanking risk and downstream for full protection of 7254 Gungadin Drive. The bankfull bench and native plantings proposed in Alternatives 1 and 2 are also included in this approach to help stabilize the southern (unprotected) bank as well as provide some flood flow energy dissipation.

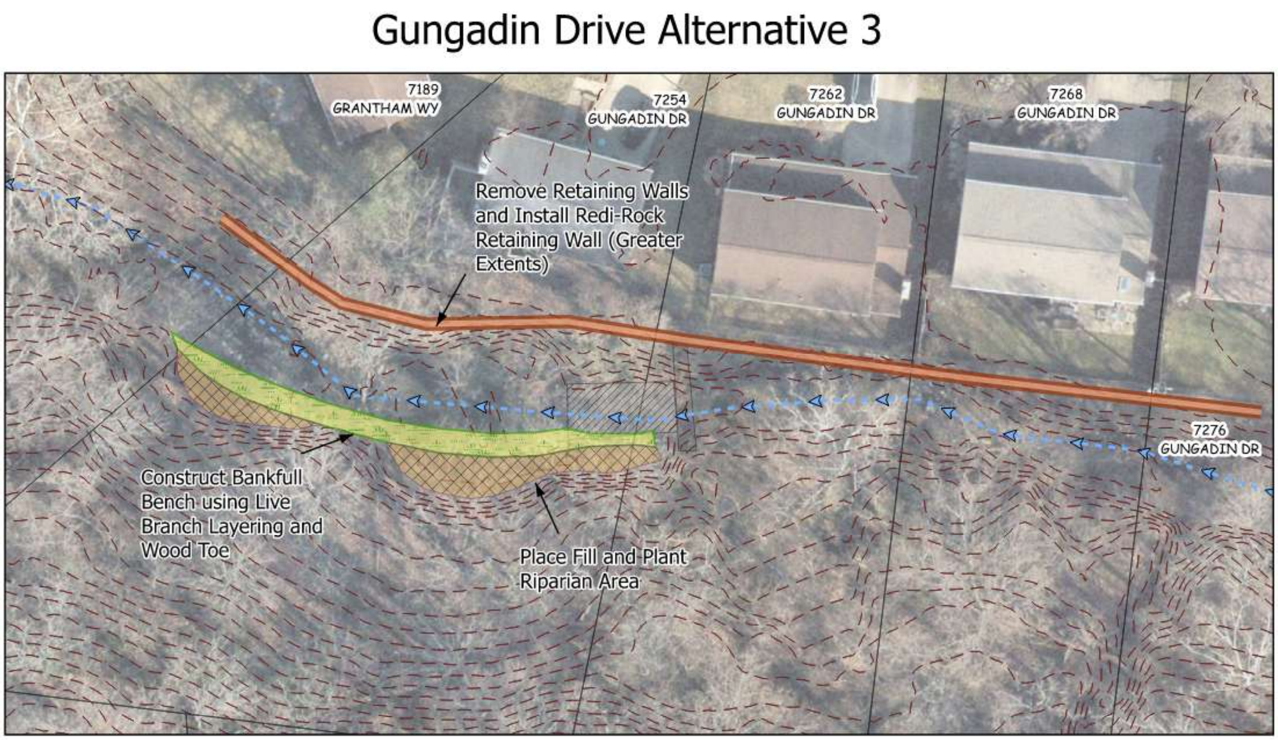


Figure 8. Schematic of Alternative 3

2.3.2 Opinion of Probable Construction Cost

Hydraulics, equipment size and access, wall materials, and scour depth will all have to be finalized for a full cost opinion. However, a planning-level OPCC is proved below for comparison to other alternatives.

Alternative 3 - Retaining Wall Only

Component	Unit	Quantity	Unit Cost	Total Cost
Construction Stake Out	LS	1	$5,000	$5,000
Clearing & Grubbing	AC	0.25	$10,000	$2,500
Erosion and Sediment Control	MO	5	$2,000	$10,000
Demolish Existing Retaining Wall	LS	1	$30,000	$30,000
Gravity Retaining Wall	SF	2,580	$70	$180,600
Bank Stabilization Fill	TON	810	$80	$64,800
Live Branch Layering	LF	125	$160	$20,000
Brushy Toe	LF	125	$225	$28,125
Meadow Seeding + Planting	AC	0.25	$10,000	$2,500
Tree planting	EA	10	$1,500	$15,000
Mobilization/Demobilization	LS	1	$23,800	$23,800
Subtotal				$382,325
General & Overhead			15%	$57,349
Construction Cost Contingency			30%	$114,698
Total				$554,371

2.3.3 Permitting Requirements

1. The retaining wall, if required to be built below the ordinary high-water mark, would require authorization under the CWA.
    a. It may be able to be permitted under NWP 13 – Bank Stabilization if it meets the previously discussed limits on disturbance (<500 linear feet, <1 cubic yard fill/running foot). The bankfull bench and plantings on the south bank would also require authorization and would be permitted under NWP 13.
    b. NWP limits are cumulative for a project, and if the wall and south side stabilization exceeded that, an USACE Individual Permit would be required. This is a much more involved process, with public comment and response, as well as a substantially longer review and approval period (typically 12-18 months versus 6-8 months for NWPs). An alternative approach would be to construct the wall further away from the stream bank so that fill would not be placed below the ordinary high-water mark, but to the depths and dimensions required to resist toe scour and bank erosion in anticipation of future stream conditions. This would eliminate the CWA permitting burden for the project but would likely increase earthwork costs and would further reduce the area of residents' yards.

2. If authorized under NWP 13, the 401 WQC would likely be issued as part of the NWP. However, if an Individual Permit is required, the project would have to be authorized under an OEPA Individual Permit, with similar increases in coordination time and cost relative to the WQC as the shift from NWP to Individual permit from USACE.

3 Concept Comparison

Key decision items from the three alternatives are presented in Table 1. Alternative 1, by directly addressing energy imbalances and promoting geomorphic stability, is likely the most effective approach that also has the lowest potential for future maintenance. It also presents the clearest permitting pathway by implementing aquatic habitat improvements. However, it has a moderate cost associated with construction.

Alternative 3, while providing erosion protection to properties in Gungadin Drive, does not address the drivers of instability and active erosion observed onsite. This option stabilizes the existing structural needs of the channel but does not reduce the risk of problems developing over time. The proposed walls will also require periodic monitoring for structural stability and effects of erosion and scour, which may require maintenance. It also has a moderate construction cost and the most uncertain path for permitting and associated schedule and costs.

Alternative 2 partially addresses drivers of instability at the dam and has the lowest estimated construction cost. The stone stilling basin may require monitoring for displacement from scouring and retaining walls will require periodic inspections for structural stability.

Table 1. Concept Design Alternative Comparison

Alternative	Effectiveness	Cost	Permitting Burden	Maintenance Requirements
1	High; Directly addresses causes of instability	Moderate; $589,896	Low; Clear application of NWP 27	Low: utilizes natural processes and materials
2	Moderate; Addresses energy concentration at dam	Lowest; $358,331	Moderate; NWP 13 likely applicable	Moderate: structures may require monitoring and maintenance
3	Low; erosion resistance only, does not address drivers of instability	Moderate; $554,371	Moderate/High; NWP 13 may be applicable, potentially requires IP	Moderate/High: structures will require monitoring and maintenance

3.1 Professional Services

To become "construction ready", Professional Services are required by Anderson Township to complete engineering design, obtain permits, develop construction contract documents, select a qualified contractor. Planning-level fees (shown in Table 2) were estimated for each of these alternatives, including the following general items.

1. Topographic Survey: Professional services commonly performed by a Professional Land Surveyor (boundary retracement, property research, and land surveying).
2. Subsurface Exploration & Geotechnical Analysis: The proposed retaining wall replacement will require Geotechnical Engineering services including subsurface exploration, soils laboratory testing, and engineering calculations.
3. Hydrologic and Hydraulic Modeling: Analyses described in this report are conceptual for planning purposes. Detailed modeling and analyses are required to develop design criteria for a stabilized stream (e.g., determine the peak instream shear stress during the 100-year, 24-hour storm event and resulting rock size required to prevent erosion).
4. Geomorphic Assessment: The existing condition of the stream will be determined by Stantec staff experienced in stream geomorphology (i.e., how natural stream systems change over time). This information will inform nature-based design and support the permitting process.
5. Permitting: Possible consulting costs are estimated for likely construction permits, described in Section 2. Note that these anticipate USACE NWP (and the corresponding OEPA WQC).
6. Construction Drawings: Plans issued for construction that have been stamped by a Professional Engineer. Includes draft drawing sets issued to Anderson Township for comment.
7. Technical Specifications and Stormwater Pollution Prevention Plan (SWPPP): Construction documents that detail how work will be performed and the standards that work performed will be held to. A written SWPPP is required for the OEPA Construction Stormwater Permit.
8. Bid Assistance: This will support Anderson Township to select a qualified and competent contractor including qualification review, response to bidder's questions, attendance of bid meetings, and preparing a bid recommendation letter. This also includes preparing additional information needed to clarify the project intent for bidders (i.e., bid addenda).
9. Construction Administration: Professional services provided during construction including material submittal review, response to contractor questions, and other communication providing clarification of the project intent. The possible consulting cost presented does not include full-time construction observation (i.e., no resident project representation is included).

Table 2. Planning Level Professional Services Fees

	Option 1	Option 2	Option 3
Topographic Survey	$15,000	$15,000	$15,000
Subsurface Exploration & Geotechnical Analysis	$10,000	$10,000	$10,000
Hydrologic and Hydraulic Modeling	$5,000	$5,000	$5,000
Geomorphic Assessment	$5,000	$0	$0
Permitting	$20,000	$15,000	$15,000
Construction Drawings	$80,000	$50,000	$50,000
Technical Specifications & SWPPP	$8,000	$8,000	$8,000
Bid Assistance	$3,000	$3,000	$3,000
Construction Administration	$15,000	$15,000	$15,000
Total	**$161,000**	**$121,000**	**$121,000**

The following are noted:

1. General Professional Services and Fees presented are planning level only. This does not accurately reflect the complete Scope, Fee, Terms, and Conditions for a Professional Services Agreement.
2. These Fees were considered for Q1 2026. Stantec recommends inflating these fees 8 to 10% per year beyond 2025.

4 Recommended Next Steps

All alternatives require further site data collection, analysis, and design to reach the implementation phase. Based upon the above comparison, Stantec recommends further evaluation of Alternatives 1 and 2. This work includes:

- Public outreach outlining the alternatives and outcomes possible within the Area of Concern.
- Informal coordination with permitting agencies to clarify pathways to authorization under the CWA and local regulations.
- Conducting a geomorphic assessment of the stream within the Area of Concern to fully understand departure from stable reference conditions and potential channel evolution, and to evaluate in-channel hydraulics for scour depths and material sizing.
- Structural assessment of the existing dam and appurtenances to refine potential retrofits to the structure.
- Geotechnical exploration and soil material property testing to refine retaining wall materials and extents.
- Detailed alternatives analysis with Opinion of Probable Construction Costs and engineering recommendations.

Completion of these items would then allow for selection of the approach that would provide the greatest return of protection to the Gungadin Drive properties for the Township's investment.

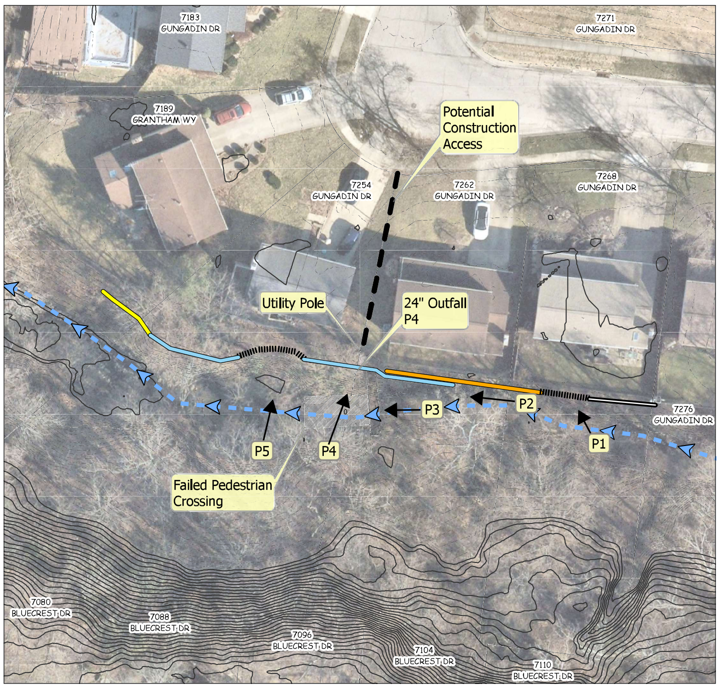
5 References

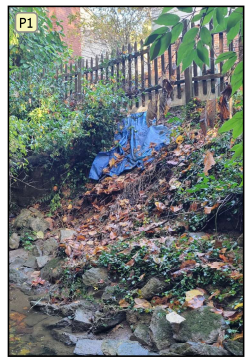
Rosgen, D.A., 1996. Applied River Morphology. Wildland Hydrology, Pagosa Springs.

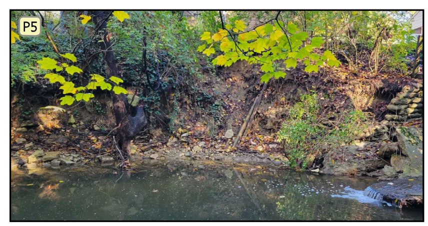
Zaimes, G., and Emmanuel, R., 2006. Stream Processes for Watershed Stewards. University of Arizona College of Agriculture and Life Sciences. Cooperative Extension Publication AZ1378g. https://repository.arizona.edu/handle/10150/146950

United States Fish and Wildlife Service (USFWS), 2024. Illustration of Floodprone Width. https://www.fws.gov/media/illustration-flood-prone-width

Appendix A Existing Conditions







Legend

- Parcels
- 1-Ft Contours
- Stream Flowline

Existing Retaining Walls

- 8' Stacked Block Wall
- Failed Wall
- Gabions
- Old Grouted Stone Wall
- Stacked Concrete Bag Wall

Low-Head Dam Infrastructure

- Dam
- Failed Apron

N

0 20 40 Feet

(At original document size of 11x17)
1 IN : 40 FT

Notes
1. Coordinate System: NAD 1983 2011 StatePlane Ohio South FIPS 3402 Ft US
2. Data Sources: 3DEP 2021 Digital Elevation Model, CAGIS
3. Background: NearMap - March 2025

Stantec

Project Location
7254 - 7268 Gungadin Drive
Sherwood, OH 45230

Prepared by JMR on 2025-11-10

Client/Project
Anderson Township
Gungadin Drive Streambank Stabilization
Alternatives Analysis Memo

173411172

Figure No.
Appendix A

Title
Existing Conditions