



Dedicated to Mine Land Reclamation, Conservation, & Economic Development in the Wyoming Valley

Analysis of Brownfields Cleanup Alternatives

Nanticoke Creek Watershed Restoration, Phases I & II
Hanover Township, Luzerne County, PA

Prepared by Earth Conservancy
June 9, 2024

INTRODUCTION AND BACKGROUND

Earth Conservancy (EC) has prepared this Analysis of Brownfields Cleanup Alternatives (ABCA) for its continuing work to restore the Nanticoke Creek watershed in Luzerne County, Pennsylvania. Because of its size, the watershed is being restored using a phased approach and as funding allows. Upon completion, the project will improve environmental health in the area through 1.) repairing hydrological functioning; 2.) reducing production of acid mine drainage (AMD); and 3.) reclaiming mine-scarred land. Sections of the restored area also may be reused for passive recreation.

The purpose of the ABCA is to provide the public with information about environmental and contamination issues at the site and to evaluate remedial alternatives. This evaluation will be revised, as necessary, and incorporated into the final site cleanup plan for review by the community, project partners, regulatory oversight agencies, and the US Environmental Protection Agency (USEPA).

Organization & History

EC is a nonprofit organization dedicated to addressing the impacts of historic coal mining activity in northeastern Pennsylvania. In 1994, EC purchased the lands of the bankrupt Blue Coal Corporation. Generally located to the west of Wilkes-Barre, many of the 16,500 acres have been ignored, seen only as permanent eyesores and reminders of the past. EC, however, views the lands as an opportunity for transformation, progress, and growth. In pursuit of this, EC 1.) Develops sustainable land-use plans; 2.) Commits to provide 10,000 acres for recreation and open space; 3.) Leads reclamation efforts of mine-scarred lands and water resources and guides their reutilization; 4.) Funds its work through the sale of Conservancy land and other resources, and through public and private sector partners; 5.) Partners with local communities to achieve our mission; and 6.) Educates the community-at-large on environmental issues, the benefits of reclamation, and effective land-use planning.

As of today, 2,000 mine-scarred acres have been reclaimed, with thousands of jobs created through their redevelopment. Two constructed treatment systems mitigate acid mine drainage pollution in local watersheds. And nearly 9,000 acres have been conserved for recreation and greenspace. EC's work has earned EC eight Pennsylvania Governor's Awards and one USEPA Mid-Atlantic Award for Environmental Excellence. Over \$62.3 million has been invested to date. All projects trace back to EC's overarching mission, one that seeks a more livable community now, and clears the way for positive, progressive change for future generations.

Site Description & Proposed Scope of Work

The Nanticoke Creek watershed (NCW) is an 8mi² sub-watershed of the Susquehanna River Drainage Basin. It extends into four municipalities: Hanover Township, Newport Township, Warrior Run Borough, and the City of Nanticoke. There are three main tributaries: 1.) Nanticoke Creek, 2.) Leuder Creek, and 3.) Espy Run. Nanticoke Creek is the longest of the three tributaries. Water quality in the headwaters, located in the Wilkes-Barre Mountains, is generally good. However, after the streams meander north, they encounter land extensively littered with mine spoils and refuse piles from historic anthracite coal mining operations. A significant portion of runoff and surface water infiltrates into deep abandoned underground mine workings, primarily located at the former Truesdale Colliery. As a result, nearly 40% of Nanticoke Creek and its tributaries are dry and devoid of aquatic life. There is no discernible riparian buffer zone in the middle portion. When the water eventually resurfaces downstream, it is severely contaminated with acid mine drainage (AMD), then making its way to the Susquehanna River.

Generally, the NCW Restoration project proposes restoring the historic alignment of Nanticoke Creek, beginning at Clarks Cross Road (Hanover Township), near the southern end of the project, upstream to Holly Street (Warrior Run), in the mountains. The full scope of work includes:

- A new alignment for the Nanticoke Creek west of Clarks Cross Road;
- Grading to generally contain the 2-year flow within the main channel of the new alignment, and allow larger flows to flow onto overbanks;
- Use of impermeable clay liner on the main channel to minimize seepage into the mine voids and reduce AMD downstream;
- Removal of a small, unregistered dam and reservoir located on Leuder Creek;
- Construction/replacement of several new and existing stream crossings

This ABCA, which focuses on the first two phases of the NCW Restoration, has been written as part of cooperative agreement requirements for funding through USEPA's Brownfields Cleanup Program. Named "Phases I and II," the project begins upstream of EC's Askam Borehole AMD treatment system, near Clarks Cross Road, and sets the stage for all future work in the watershed. Currently, the Nanticoke Creek flows under Clarks Cross Road. Already, hydraulic analysis indicates that the Clarks Cross Road bridge will be overtopped by a 10-year event. Furthermore, downstream of the bridge, the Nanticoke Creek runs between several residential areas, some of which are within the existing 100-year floodplain.

Since the entire restoration project will reconnect the upstream Nanticoke Creek watershed to the downstream watershed, flows lost to the subsurface geology will be reduced. As a result, streamflow will increase in the lower segments of the creek. Due to the low conveyance capacity of the Clarks Cross Road bridge and the shallow channel between Clarks Cross Road and South Main Street, this existing reach of Nanticoke Creek should be expected to experience increased flooding with a no build alternative. A map depicting the general location of the projects is included as Appendix A.

Cleanup Objectives

The objectives of the NCW Restoration are:

1. Reduction of nonpoint source pollution (sediment, AMD) in the watershed;
2. Mitigation of flood hazards in area neighborhoods;

3. Restoration of natural channel conditions for the creek and its watershed;
4. Improvement of wildlife habitat;
5. Recovery of the site for community benefit (e.g., safety, aesthetics, economics).

These goals are consistent with EC's mission, EC's original *Land Use Plan* (1996), and EC's ongoing work in the NCW. Moreover, they are consistent with the goals, recommendations, and regulations of EC's frequent partners on reclamation and restoration projects, including USEPA, the US Office of Surface Mining and Reclamation Enforcement (OSMRE), US Army Corps of Engineers (USACE), the Pennsylvania Department of Environmental Protection (PADEP), and PADEP's Bureau of Abandoned Mine Reclamation (BAMR).

SUMMARY OF PREVIOUS INVESTIGATIONS

In 1993, prior to Earth Conservancy's purchase of the Blue Coal Corporation estate, all property underwent a field assessment by Resource Technologies Corporation. Many of the tracts along the Nanticoke Creek and its tributaries were identified as strip-mined or containing mine dumps or overburden piles. As described in the *Soil Survey of Luzerne County* (1981) by the US Department of Agriculture:

- Strip mine (Sm) soils are a “nearly level to very steep mixture of the bedrock and unconsolidated soil and rock material through surface mining to expose anthracite coal. Runoff is slow to very rapid, and the hazard of erosion is moderate to severe. Most areas are extremely acid” (p. 89).¹
- Mine dump (Mg) soils consist of low-quality coal and rock discarded during coal processing, usually placed in roughly-graded piles near former breakers (p. 31).
- Overburden is the unneeded soil and rock that is excavated during the strip-mining process. It is usually placed in piles (p. 49).

Strip mine and mine dump areas are not considered to be comprised of hazardous material.

In 2005, an integrated Environmental Site Assessment (ESA) was completed by USACE for the Nanticoke Creek watershed, as part of its work with PADEP, PADEP BAMR, and EC in developing the *Detailed Project Report and Integrated Environmental Assessment of the Nanticoke Creek Watershed*, under Section 206 – Ecosystem Restoration. While the report indicated upper reaches of the watershed were healthy, it documented the damage to the streams when they encountered the Sm-Mg soils:

- Historically, Nanticoke Creek flowed in a northwest direction until it met Leuder Creek. However, its surface flow is lost as it passes through Sm-Mg areas at the base of the mountain. Almost all of its water infiltrates into the mine pools. There currently is no actual confluence with Leuder Creek.
- The last 500 feet of Leuder Creek is a concrete flume, built in 1930's-40's. However, the flume has buckled. Water travels through these cracks and into the mine pool. Water that does stay above-ground ends in a pond. The report notes the habitat is of poor quality and lacks vegetation and structure. There is no real riparian or stream habitat.

¹ Bush, R.D. (1981). *Soil Survey of Luzerne County, Pennsylvania*. Washington, D.C.: U.S. Department of Agriculture Soil Conservation Service in Cooperation with The Pennsylvania State University College of Agriculture and the Pennsylvania Department of Environmental Resources State Conservation Commission.

Despite the physical impairments to the streams, no recognized environmental conditions (RECs) were identified that would limit potential future uses.

In 2018, LaBella Associates, Inc., completed a Phase I ESA for the Truesdale Bank. This ESA confirmed the majority of the area is covered by Sm-Mg soils. There were no ongoing or anticipated environmental enforcement actions related to the site. No RECs were found to exist. The site was found not to pose a significant environmental risk. A Phase II ESA was not recommended.

In October 2022, in lieu of a Phase II ESA, USACE provided a written statement reaffirming its analysis of and guidance for restoration of the Nanticoke Creek Watershed from its 2005 *Detailed Project Report*. Recommended actions included re-evaluation of historic stream alignments, reconstruction of stream channels, reclamation of mine-scarred lands, and use of a natural stream design approach. OSMRE issued a letter of concurrence with the USACE's statement regarding these recommendations on November 7, 2022.

SITE ASSESSMENT FINDINGS

During any of the prior investigations, no recognized environmental conditions (RECs) were identified on-site. Consequently, this ABCA addresses environmental, safety, social, and economic concerns linked to the property – i.e., the broader health impacts that brownfields may pose to a community. As described by USEPA², these include:

- **Environmental Challenges:** The health and safety of people and animals can be at risk if a property presents exposure to environmental contaminants. If not addressed, contamination can spread to nearby properties as well.
- **Economic Challenges:** When property owners and potential investors suspect a property is contaminated, they may fear they will be held liable for past contamination. [...] Until a brownfield is properly characterized, it may be passed over for redevelopment.
- **Social Challenges:** Over time, a neglected property may become an eyesore, contributing to neighborhood blight and social decline. Blighted properties can weaken local real estate markets, add stress to community social ties, and make it difficult for the community to attract needed services and investment.

Lands within the Nanticoke Creek watershed have all of the issues identified above. The scars of mining affect not only the land. Damage affects the water and air, the infrastructure and the economy, which in turn undermines a community's well-being. Most directly, restoring the NCW will

- Repair an inoperative hydrological system, thereby strengthening resiliency against climate change threats;
- Improve water quality by mitigating the production of AMD, both above and below ground;
- Revive a highly-debilitated ecosystem, while augmenting natural carbon sequestration capabilities of the area; and
- Reestablish a local greenspace, leading to quality-of-life benefits.

² USEPA. (2021). *Brownfields and Land Revitalization Program Impacts*. <https://vaswcd.org/wp-content/uploads/2021/10/EPAs-Brownfield-and-Land-Revitalization.pdf>

FORECASTED CLIMATE CONDITIONS

According to the U.S. Global Change Research Program, climate trends for the northeast region of the United States include “heat waves, coastal flooding, and river flooding [that] will pose a growing challenge to the region’s environmental, social, and economic systems. This will increase the vulnerability of the region’s residents, especially its most disadvantaged populations.”³ Some of these factors, most specifically increased precipitation that may affect flood waters and stormwater runoff, are most applicable to the restoration of the Nanticoke Creek watershed.

- According to FEMA Flood Zone Map 42079C0354E (11/02/12), the majority of Phases I and II are classified as Zone A (i.e., with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage). This occasional flooding – due to poor hydrologic functioning – is one of the reasons the stream restoration is being undertaken.

A changing climate may result in more frequent and intense precipitation events, which could generate localized stormwater impacts. This underscores the importance of the project, which will improve current stream/stormwater infrastructure to reduce potential flooding.

APPLICABLE REGULATIONS, LAWS, & STANDARDS

In consideration of current and future uses of the Truesdale Bank / Nanticoke Creek site, cleanup plans will provide for adequate protection of human health and the environment. EC and its procured engineers/contractors will adhere to all applicable local, state, and federal laws, regulations, and guidance in relation to brownfields and environmental remediation, including, but not limited to, the following:

Laws & Regulations

- Neither Truesdale Bank nor the associated waterways have been identified by NPL, or are under CERCLA or RCRA orders. Furthermore, EC is not potentially liable for contamination in or along Espy Run under CERCLA §107, as stated in the Deed of Sale from the Trustee in Bankruptcy for the Blue Coal Corporation. All Appropriate Inquiries (AAI) were conducted prior to sale. EC is considered an Innocent Landowner (ILO) and is not potentially liable for AMD pollution originating at the site.
- No historic sites are on or eligible for the National Register of Historic Places for the Truesdale Bank.
- In accordance with state and federal guidelines, the project area was screened through the Pennsylvania Natural Diversity Index. No adverse impacts to species of concern were anticipated from the proposed project, as long as appropriate measures for mitigation are implemented.
- Prior to construction, all appropriate permits will be obtained. This includes submission and approval of an Erosion and Sediment (E&S) Control Plan to the Luzerne Conservation District (LCD), which will identify sources of erosion and sediment on the property and Best Management Practices to implement to address each. Upon approval of the E&S plan, a National Pollutant Discharge Elimination System (NPDES) permit will be issued.
- Laws and regulations that are applicable to this cleanup include the Federal Small Business Liability Relief and Brownfields Revitalization Act, the Federal Davis-Bacon Act, state environmental law, and local municipality bylaws. Federal, state, and local laws regarding procurement of contractors to

³ U.S. Global Change Research Program. (2014). Key Messages about the Northeast. *National Climate Assessment*. www.globalchange.gov/explore/northeast

conduct the cleanup will be followed.

- During construction, the contractor will adhere to all federal, state, and local rules and regulations relating to the Occupational Safety and Health Administration (OSHA), including monitoring the site for hazardous conditions during work. The construction contract will require the contractor to immediately notify EC and the project engineer if a hazardous environmental condition is encountered.
- Because no hazardous substances have been identified at the project site, institutional controls, restrictions, and/or compliances will not be required.

Cleanup Oversight

To ensure compliance with regulatory requirements and project goals, EC will provide project management, administrative services, and technical expertise during work. The selected project engineer will also assist in these roles, including periodic site visits to monitor progress and adherence to plans. Additional inspections will be performed by LCD and PADEP to verify regulatory compliance and ensure any inconsistencies are immediately addressed.

Documentation & Reporting

Phases I and II of the Nanticoke Creek Watershed Restoration will comply with all USEPA Brownfields Program requirements (e.g., information repository, public comment, ABCA, cleanup oversight, etc.). EC will be responsible for all documentation and reporting.

EVALUATION OF CLEANUP ALTERNATIVES

To address the brownfield conditions at the site, three alternatives were considered for the Phase I and II restoration projects. To satisfy USEPA requirements, the effectiveness, implementability, and cost of each alternative must be considered prior to selecting a recommended cleanup plan. Generally, all alternatives are in the same location; only the methods of remediation differ.

Alternative #1 | No Build

Alternative #1 leaves all issues of concern in their existing state. No mitigation of environmental damage would occur, nor would issues related to safety, aesthetics, flooding, or AMD be addressed. Work on upstream segments would be unviable. This alternative would neither meet EC's stated objectives for the project, nor conform to EC's mission.

Alternative #2 | Realignment & Channel Reconstruction

Alternative #2 involves realignment of approximately 700LF of the Nanticoke Creek and 1,750LF of general stream reconstruction. Specifically:

- **Phase I:** The current Clarks Cross Road bridge will be abandoned, eliminating a sub-capacity waterway obstruction from the stream. Nanticoke Creek will be regraded with realignment, with a main channel conveying the base flow and storms up to the 2-year flow, and overbanks sized to convey the 100-year storm without roadway overtopping. Although this model creates loss of flow to the existing channel, it reduces flood risks to an adjacent neighborhood. This also will help with water quality by relocating baseflow away from the development and will be augmented with riparian buffer plantings.

- **Phase II:** A composite design will be used for channel reconstruction. This approach will create a main channel sized to convey flows up to the 2-year storm, which will encourage a perennial reconnection of the stream. Separate overbank areas will help to convey larger flows with less depth. Vegetation on the overbank areas will also slow flows. Allowing flow onto the overbanks during high flow events will provide intermittent hydrology to these gently sloping areas, further supporting the channel/floodplain ecosystem.

The cost estimate for Alternative #2 is included as Appendix B. This alternative will improve safety, environmental, and aesthetic conditions at the site; and be completed with funds available.

Alternative #3 | Realignment (with Secondary Channel) & Channel Grading

Alternative #3 follows the same general footprint as proposed in Alternative #2. However, several features differ. In this scenario:

- **Phase I:** In addition to constructing the new channel of Alternative #2, the existing Nanticoke Creek channel is left and restored. This approach would provide more hydraulic capacity than one channel alone; potentially reduce the required size of the new stream crossing; and reduce the flooding in the existing channel, without eliminating base flow. However, because the watershed is limited in size and baseflow is limited, there are concerns if anticipated flow can appropriately support two channels.
- **Phase II:** Channel reconstruction would consist of a single, trapezoidal shape, which would carry both baseflows and flood flows. Consequently, the channel would need to be sized to convey flows from the base flow all the way up to the 100-year storm, resulting in a wide and deep channel. Challenges of this model include:
 - 1.) The larger base width of this channel – especially when paired with insufficient baseflow – would minimize the base flow depth, potentially causing stagnant flow, contrary to the goal of stream reconnection.
 - 2.) Flood flows would traverse the stream with high velocities because they would be contained in a single section with a lower roughness, and therefore have limited means of slowing the flow naturally.
 - 3.) Erosion and channel stability would likely degrade the channel over time because of the increased depth and shear acting on the bottom and sides of the channel.
 - 4.) Earthwork would be larger than a composite section due to the larger width of the channel bottom and the requisite side slopes to create a stable channel.

Recommended Cleanup Alternative

After reviewing remedial alternatives, the recommended alternative is **Alternative #2, Realignment and Channel Reconstruction**. Alternative #1 cannot be recommended since it does not address site risks and impacts. Although Alternative #3 would establish a new stream channel, the secondary channel will be unlikely 1.) to achieve adequate flows to support a perennial stream; and 2.) to reduce flood risks to nearby residences when increased flow from the upper watershed occurs. Furthermore, the proposed channel design 1.) requires a greater amount of earthwork; 2.) fails to incorporate a natural design approach; and 3.) is more prone to erosion from uncontrolled flow velocities. Because of the additional grading and the need for additional channel lining materials, costs would also be substantially higher.

Alternative #2 has the benefits of improving water quality in these sections of the Nanticoke Creek, mitigating flooding risks, and creating a more natural channel, which includes reestablishment of the flood plain... an excellent opportunity for rehabilitation of local ecosystems. Moreover, the work for both phases is a lesser amount than would be estimated for Alternative #3.

ADDITIONAL CONSIDERATIONS

Green Remediation Potential

The selected alternative employs strategies consistent with USEPA's *Principles for Greener Cleanup* policy by minimizing the environmental footprint of cleanup activities in that it achieves the desired safety, environmental, and reuse impacts in less space, with less materials/activity, and in a shorter period of time. Consequently, less energy and resources are used, fewer emissions are released, and a smaller amount of habitat is disturbed.

Public Participation

Public comment on Phases I & II of the NCW Restoration project are important to the cleanup process. A final cleanup method will be selected only after the public is given adequate time to review and comment on the ABCA and all comments have been reviewed and responded to appropriately.

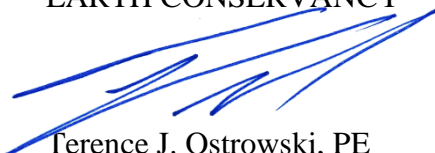
EC will solicit input from the public on this draft ABCA by 1.) posting a copy of the ABCA on EC's website; 2.) notifying the public of the ABCA's availability on social media; and 3.) publishing a public notice inviting input on the ABCA at a public meeting. Modifications to the ABCA may be made on the proposed alternative based on new information and/or comments received from the public.

Limitations & Contact

The contents and format of this report are based upon information available and are comparable to cleanup planning documents developed and approved in connection with previous USEPA Region 3 Brownfields Grant programs/projects. This report is a work of opinion; therefore, we cannot offer any warranty regarding our conclusions, advice, or recommendations.

Questions or comments regarding the content of this ABCA report are welcome and should be directed to the undersigned at 570.823.3445 or t.ostrowski@earthconservancy.org.

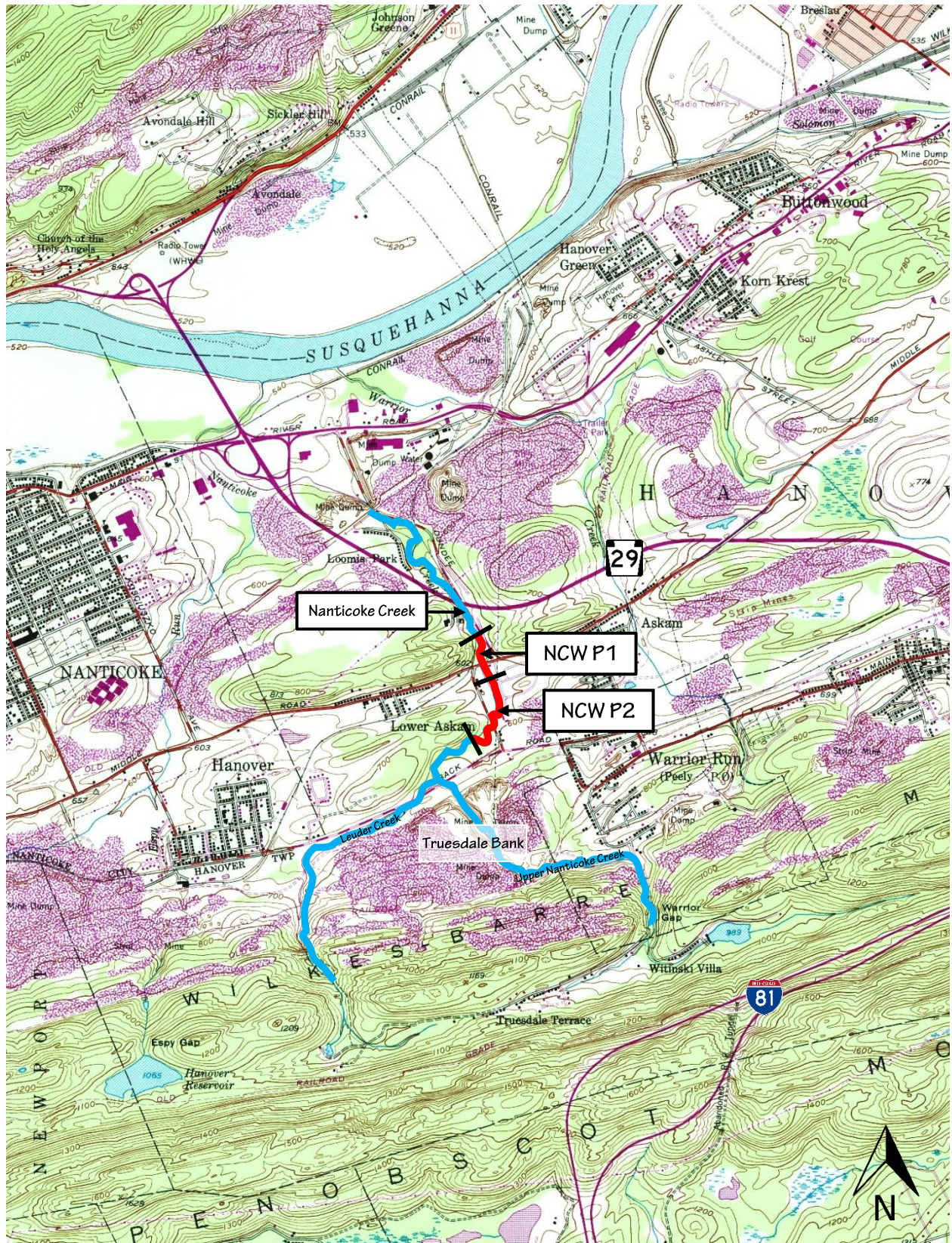
EARTH CONSERVANCY



Terence J. Ostrowski, PE
President & CEO

Conceptual Map of Cleanup Alternatives

NCW Restoration, Phases I & II | Hanover Township, Luzerne County, PA



Cost Estimate: Alternative #2

Realignment of Nanticoke Creek and Restoration of 1,750LF of Stream Channel

NCW Restoration, Phases I & II

Hanover Township, Luzerne County, PA

Item No.	Item	Qty.	Unit	Unit Price	Total Price
1	Design/Preparation of Plans	1	lump sum	\$ 50,000	\$ 50,000
Phase I					
2	Mobilization / Demobilization	18	pieces	700	12,600
3	Performance / Payment Bonds	1	lump sum	45,000	45,000
4	Construction Layout	3	days	2,200	6,600
5	Project Supervision	40	days	500	20,000
6	Traffic Maintenance / Protection	1	lump sum	90,000	90,000
7	By-Pass Pump	1	lump sum	15,000	15,000
8	General Erosion Control	1	lump sum	35,000	35,000
9	Mass Earthwork: Cut/Spoil	3,000	cy	18	54,000
10	Channel Lining - Rip Rap	700	tons	50	35,000
11	5' x 20' Concrete Box Culvert	116	lf	2,500	290,000
12	Concrete Endwall	2	each	46,200	92,400
13	Rip Rap Scour Protection	200	tons	50	10,000
14	Utility Relocation	1	lump sum	34,600	34,600
15	Full-depth Pave / Road Restoration	900	sy	115	103,500
16	Type 2-S Guiderail	400	lf	46	18,400
17	Guiderail End Sections	4	each	2,280	9,120
18	Topsoil, Seed, & Mulch	1	acre	6,000	6,000
Subtotal:					\$877,220
Contingency (10%):					87,722
Total P1 Estimate:					\$964,942

Item No.	Item	Qty.	Unit	Unit Price	Total Price
Phase II					
19	Mobilization / Demobilization	8	pieces	700	5,600
20	Performance / Payment Bonds	1	lump sum	47,500	47,500
21	Construction Layout	3	days	2,200	6,600
22	Project Supervision	40	days	500	20,000
23	Traffic Maintenance / Protection	1	lump sum	3,500	3,500
24	By-Pass Pump	1	lump sum	20,000	20,000
25	General Erosion Control	1	lump sum	62,500	62,500
26	Mass Earthwork: Cut/Spoil	23,000	cy	18	414,000
27	Rock Excavation	5,000	cy	26	130,000
28	Grass-lined Diversion Swale	450	lf	25	11,250
29	Low-flow Channel Excavation / Disposal	550	cy	18	9,900
30	Furnish / Place Impervious Layer	1,200	tons	35	42,000
31	Furnish / Place Sand Bedding	1,300	tons	30	39,000
32	Furnish / Place Class 2 Type B Geotextile	2,300	sy	3	6,900
33	Channel Thalweg Grading	250	cy	30	7,500
34	Furnish / Place 1B Thalweg Stone	80	tons	45	3,600
35	R-5 Rip Rap Placement	80	tons	50	4,000
36	NAG S075 Slope Protection Mat	6,000	sy	2	12,000
37	Seed & Mulch	6	acres	6,000	36,000
38	Riparian Buffer Planting, 6"-12" Sprigs	650	each	30	19,500
				Subtotal:	\$901,350
				Contingency (10%):	90,135
				Total P2 Estimate:	\$991,485
				Total Project Estimate:	\$2,006,427