# Summary of Data Analysis, Collection, Generation and Consultation Activities

**Coal River Watershed Project Plan and Environmental Assessment**
**Kanawha County, West Virginia**
**February 2026**

GFT Project No.: 084562



Prepared for:
Capitol Conservation District and
Natural Resources Conservation Service (NRCS)

GFT

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## PURPOSE

The Capitol Conservation District (District), in combination with the Natural Resources Conservation Service (NRCS), is preparing a Watershed Plan and Environmental Assessment (Plan-EA) to address watershed protection, public recreation, public fish and wildlife, water quality and other resource concerns, as may be identified during the planning study process, associated with the remnants of an obsolete concrete dam located across the Coal River near the town of Tornado, West Virginia. The concrete dam, constructed in the 1920's to enhance flow to a gristmill owned by Roman Pickens along the west riverbank, is in the same general area as an 1850's navigational dam which supported the coal industry (Lock and Dam No. 3) and which has since been removed. The District's preparation of a Plan-EA is based on a Preliminary Investigation and Feasibility Report (PIFR), prepared by NRCS, dated November 2023, which determined the project has the potential to result in positive environmental, economic and social impacts, making the planning study eligible under the Watershed Protection and Flood Prevention Act (PL83-566).

The District secured the services of GFT (formerly Gannett Fleming), to assist with engineering and environmental investigations required to complete the Plan-EA, which is being developed in accordance with the National Environmental Policy Act (NEPA) and NRCS guidelines. NEPA requires sound planning study processes to ensure projects consider possible impacts to the natural and human environment. Natural environment concerns could include impacts to wetlands and waterways, fish and wildlife resources, threatened and endangered species, floodplain management, forests and riparian areas, among others. The human environment may include public health and safety, water quality, recreation, cultural and historic properties, and hazardous wastes and materials, among others. The results of these investigations will be used to guide the selection of the preferred alternative (which remains to be determined) to establish a solution that meets the goals of the project while eliminating or minimizing adverse impacts to the natural and/or human environment.

As part of the Plan-EA, the District has gathered information on the natural and human environment within a study area that extends along the alignment of the Coal River approximately 1,000 linear feet upstream of the existing concrete dam to the Smith Creek Road bridge and approximately 1,600 linear feet downstream of the existing concrete dam (refer to **Figure 1**).




**Figure 1.** Project study area boundary (identified by red line) surrounding the concrete dam which served the former Roman Pickens gristmill.

Data analysis, collection, generation and consultation activities performed to date under the Plan-EA include the following field and desktop evaluations (note that all data collection activities have been limited to the study area unless noted otherwise):

1. Background investigation into the history of the site.

2. Visual observation and assessment of the existing concrete dam.

3. Assessment of public safety and liability associated with the concrete dam and remnants of Lock No. 3.

4. Topographic and bathymetric surveys of the riverbed to gain an understanding of the existing site conditions.

5. Sediment depth surveys throughout the riverbed to assess the location and depth of sediment, if any, that may be present.

6. Sediment sampling to characterize the chemical composition of the sediment accumulations within the riverbed. Sampling results will determine if special handling or disposal requirements may be required as part of the preferred alternative. The results of the sediment sampling plan are summarized in a report entitled Sediment Characterization Report, Coal River Lock and Dam No. 3, dated February 2026, bound separately.

7. Field investigations to identify wetlands and waterways. This information will be used to help guide the selection of the preferred alternative to avoid/minimize environmental impacts. A stream assessment was conducted at the same time as the wetland and waterways investigations to document aquatic life, specifically macroinvertebrates, within the study area which provides insight into the health of the Coal River. This information will be used to assess stream impacts and potential mitigation requirements when

evaluating alternatives. The results of the wetland and waterways investigations are summarized in a report entitled Natural Resources Report, dated January 2026, bound separately.

8. Visual assessment of the riverbanks to identify areas of erosion. The visual assessment extended approximately two miles upstream of the dam.

9. Agency consultation to identify threatened and/or endangered species (i.e., plants and/or animals) that may exist within or in proximity to the study area.

10. Hydraulic analysis to assess the impact that the proposed project will have on water surface elevations within the river, and specifically on the 100-year flood elevations. The analysis evaluates the impacts with and without the dam in place. The results of the hydraulic analysis are summarized in a report entitled Hydraulic Analysis Report, Lock and Dam No. 3, dated January 2026, bound separately

11. Cultural resource evaluations to assess the archaeological potential (historic and precontact) of the study area (i.e., Phase IA and Phase IB studies) and a review of above-ground architecture and historical resources within the study area. The results of the cultural resource evaluations are summarized in four reports (bound separately), including (1) a Phase IA Archaeological Research Report, dated October 2025, (2) an Above Ground Historic Resources Desktop Survey, dated January 2026, (3) an Architectural and Historical Resources Identification Survey Report, dated December 2025, and (4) a Phase IB Archaeological Survey Report, dated February 2026.

The results of each data collection activity are summarized herein, and in some cases, the results are provided in a separate supporting report.

## 1.0 PROJECT BACKGROUND

The town of Tornado is located on the Coal River approximately 3 miles south of St. Albans and 8 miles west of South Charleston in Kanawha County, West Virginia. The initial industrialization of Kanawha County began with the rise of the salt industry. The region, hosting over 50 salt furnaces, was capable of producing around 9,000 bushels of salt per day by the late 1840s. In the Coalsmouth area, renamed as St. Albans in 1872, logging and related enterprises were prominent businesses at the turn of the century, including sawmills and boat building (Dean 2007:7). It was also during this period in the mid-nineteenth century that cannel coal production boomed along the Coal River (Harper 2024).

One bushel of cannel coal could be processed to produce approximately two gallons of crude oil. This product was easily ignited and burned with a steady bright flame, making it useful for lamps, fireplaces and general illumination. This product quickly replaced whale oil for illumination purposes and propelled the need for cannel coal in the 1850's and 1860's which was found in abundance along the Elk, Coal and Kanawha Rivers.

One of the largest cannel coal producers of the region was William M. Peyton. A lawyer from eastern Virginia, Peyton explored the western part of the Commonwealth in the 1840s in search of cannel coal deposits. By 1848, he found extensive reserves along the Big Coal River and began purchasing land as early as 1849. Peyton organized mining efforts at Peytona, approximately 16.5 miles southeast of the current town of Tornado, which included organizing the Virginia Cannel Coal Company in 1851. Between 1849 and the organization of his company in 1851, Peyton oversaw the mining of thousands of bushels of cannel coal in the Peytona area. A newspaper account in 1850 described the transportation of the coal from this region, utilizing the Coal River system to ship the harvested coal to larger markets along the Kanawha and Ohio Rivers. The article reported the loaded boats passed through the Upper Falls at the town of Tornado and the Lower Falls located closer to St. Albans, using crude sluice dams that channelized water to create deeper water depths over these natural rock outcrops (Athey 2024; Dean 2007:22-26).

Other coal companies were also established in the area during the 1850s, putting pressure on the region for internal transportation improvements. In 1851, Peyton sold land to the newly-established Cannel Coal Company of Coal River in exchange for shares in the company. Peyton also partly organized the Western Mining and Manufacturing Company upriver from Peytona in 1853. At least three additional coal companies were established in the area during the early 1850s, the Kanawha Mining Company, the Coal River and Kanawha Mining and Manufacturing Company, and the Coal River and Ohio Mining and Manufacturing Company; all three by local landowner and lawyer, Edward Kenna. However, for these companies to prosper, a reliable means navigating the Coal River was needed for this growing industry (Dean 2007:28-37).

In 1849 Peyton organized the Coal River Navigation Company to construct improvements in the Coal River watershed to more easily navigate the river system. The first improvements along the river occurred in late 1849 and consisted of removing obstructions from the water, widening the riverbed, as well as constructing the crude sluice navigation system at the Upper and Lower Falls. The company, which officially organized in December 1849 following Peyton's initial improvements to the river, decided in the first meeting to "attempt more than a sluice navigation" by constructing more substantial locks and dams (Dean 2007:46-47).

Between 1854 and 1859, the Coal River Navigation Company built a series of locks and timber crib dams on the Coal, Big Coal, and Little Coal Rivers. Nine sets of locks and dams were built along the three rivers. The project

covered 35 slackwater miles from the Coal River's confluence with the Kanawha to the town of Peytona, including a single site (Lock A) on the Little Coal near Ezekiel Branch (refer to **Figure 2**). At the start of construction in 1854, Edward Kenna, who owned both sides of the river at Upper Falls in present-day Tornado, agreed to give half an acre of land on the lock side (Lock No. 3) for maintenance space and a lock keeper's house. In exchange, Kenna requested a millrace and head gates on the west side of the falls to power his mill. Locks 1 through 4 were completed by 1856, and Locks 5 through 8 were built in 1856-1857.

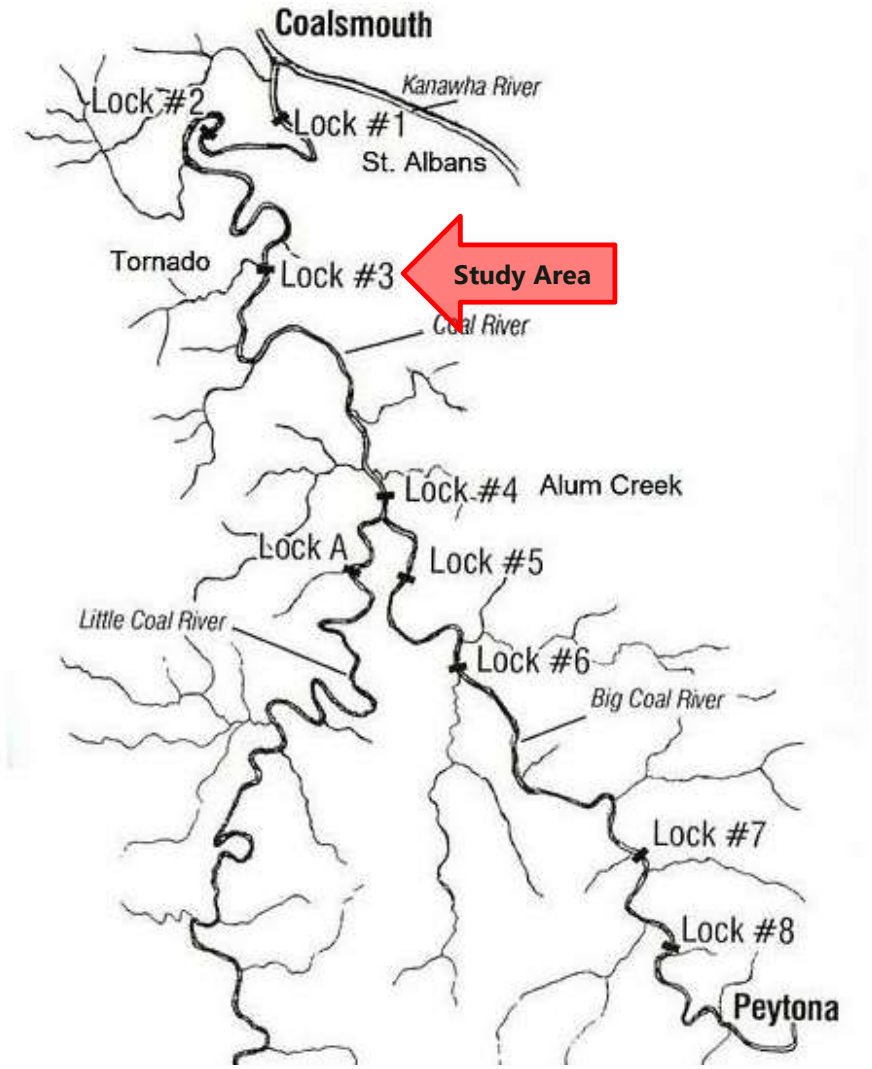



**Figure 2.** Map of Coal River watershed showing lock and dam locations (Source: wvencyclopedia.org).

All nine lock and dam structures on the Coal River were reported to be of similar construction, consisting of timber cribs filled with stone (refer to **Figure 3**). Where bedrock was present, the base timbers of the lock and dam were recessed into parallel keyways hewn into the bedrock. These keyways, in combination with metal spikes that connected the timbers to the bedrock, were intended to produce a stable structure that was resistant to sliding. The cells formed by the timber cribbing varied in size based on the height of the dam; however, the average size was believed to be 10 feet square, and the base of each dam may have been up to four cells wide in the

upstream/downstream direction (refer to **Figure 4** which shows the lock and dam construction for Lock and Dam No. 2). The dam was then covered with thick boards, including the upstream face where the boards were driven into the ground to produce a more watertight structure. The locks were 125 feet long by 24 feet wide and had a minimum operating water depth of four feet. The locks were also built using timber cribs but had additional oak planks around their foundations to prevent undermining. Notable exceptions to the general design were Lock Nos. 2 and 3, where the lock construction included excavation into bedrock to create the necessary operating water depth (denoted with yellow shading in **Figure 4**). The rock excavation remains visible at Lock No. 3 in present day. The navigational dam at the Upper Falls near the town of Tornado (Lock and Dam No. 3) was reported to be 273 feet long, having a height 15.6 feet above the mitre sill and the lock had a total lift of 11.6 feet (Binning and Moore 1997; Dean 2007:70-72).

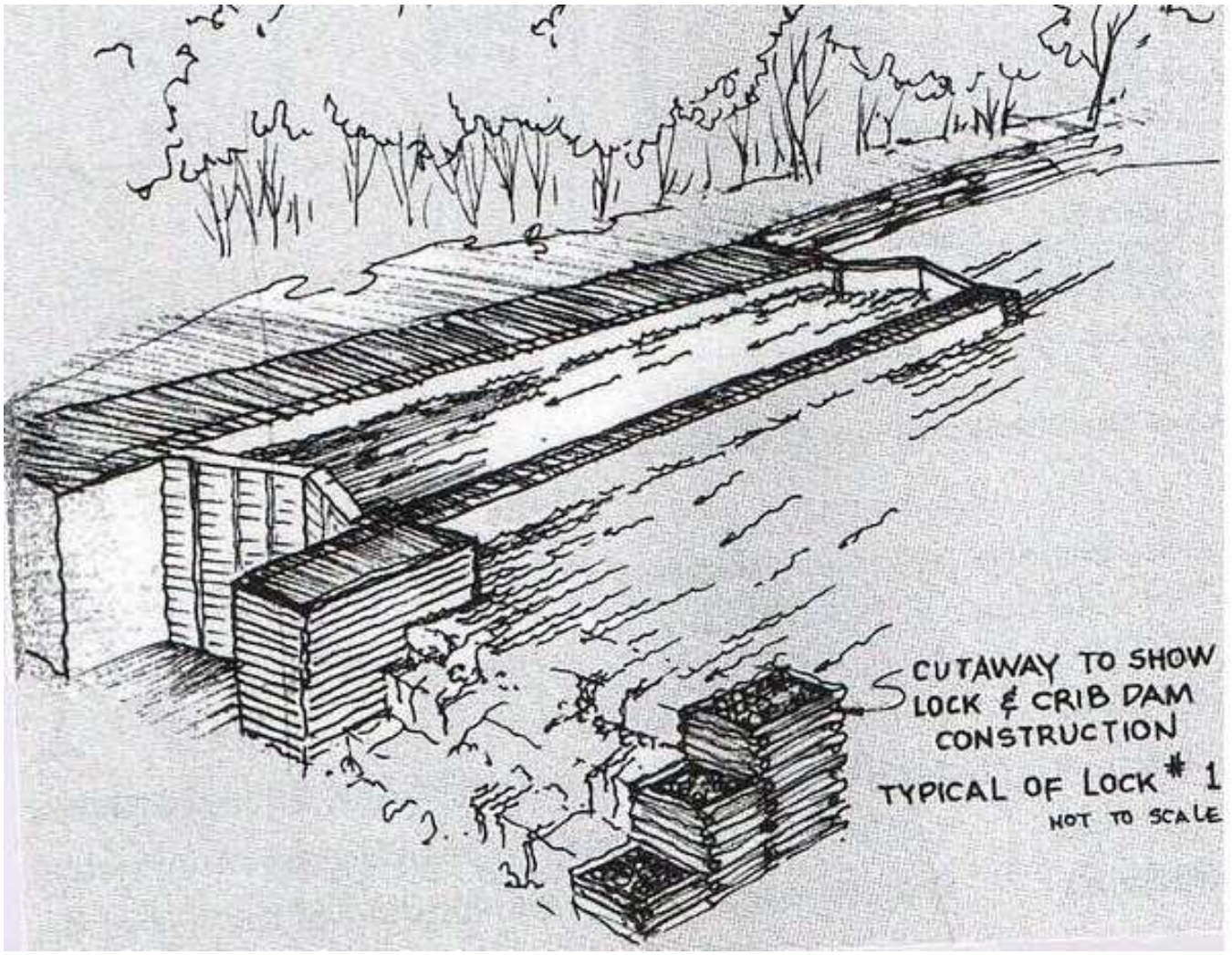
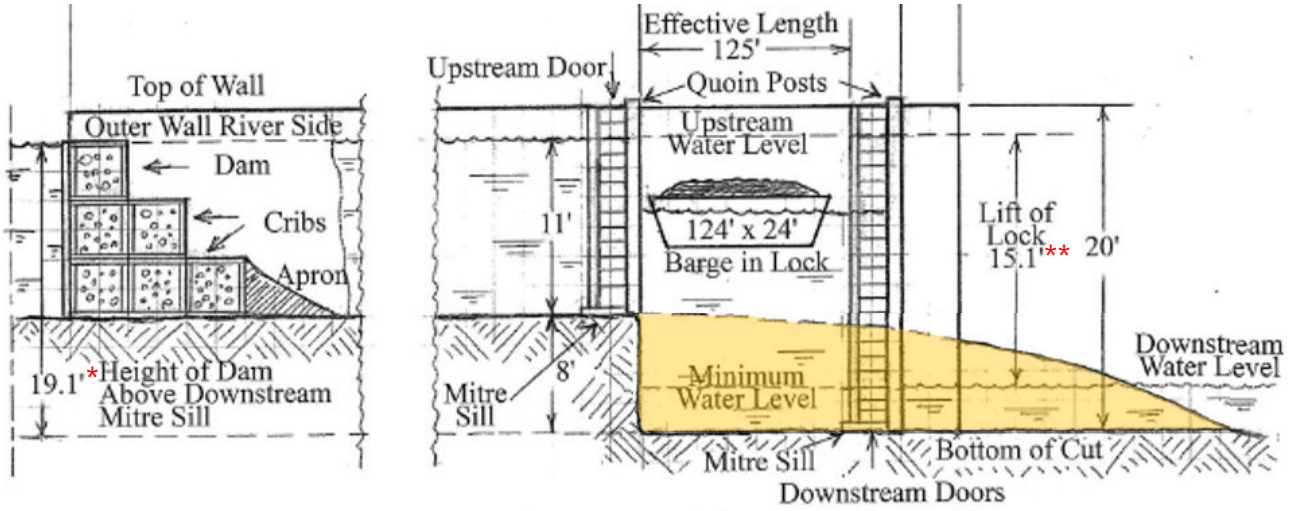



**Figure 3.** Artist rendering of typical lock and dam on the Coal River, Lock and Dam No. 1 shown (Source: wvencyclopedia.org).




* Height of Dam Above Downstream Mitre Sill = 15.6 feet for Lock and Dam No. 3
** Lift of Lock = 11.6 feet for Lock and Dam No. 3

**Figure 4.** Typical lock and dam construction (Lock and Dam No. 2 shown). Yellow shading represents rock excavation needed to establish minimum operating water depths in the lock. (Dean 2007:76)

Steamboat navigation operated on the river through the mid and late 1850s, beginning at the mouth of Coal River and extending further upriver as the locks were completed. The first steamboat to pass through all the locks and reach Peytona occurred in March of 1859. However, the life of the Coal River lock and dam system was short lived. At the onset of the Civil War in 1861, most coal companies that utilized the navigation system and paid for the lock tolls ceased operations. Also in 1861, flooding caused widespread damage to the navigation system. While the flood damage was repaired in 1867 following the Civil War, the need for the lock and dam system on Coal River was dwindling. Railroad construction throughout the region provided faster and more efficient modes of transporting people and goods. Also, competition with coal companies in southwestern Pennsylvania and the discovery of natural oil fields which could produce kerosene for illumination needs, reduced the need for cannel coal. By 1880, the Peytona Cannel Coal Mining Company closed. With the loss of revenue from the coal company, the Coal River Navigation Company eventually closed in 1881 and the Coal River lock and dam system fell into disrepair.

River travel on Coal River via the locks and dams ceased in 1881. Most of the works were scrapped for parts and materials. From the 1880s through the turn of the twentieth century, the river was used for driving logs to sawmills built along the river and its connected river systems. As a result, the remaining cannel coal companies disbanded and disposed of their assets (Dean 2007:104, 114-115). Meanwhile, the burgeoning logging companies utilized the Coal River to float their logs downstream to the mills where they could be processed. The river was largely unobstructed by the former lock and dam structures by 1882, which allowed the river to flow freely (Dean 2007:117; Binning and Moore 1997).

While other industries abandoned use of the river by the early 1900s, mills continued to operate along Coal River until the mid-twentieth century, utilizing the flow of the river to operate the mills and move logs down river. The most notable gristmill to be built along the Upper Falls of Coal River was constructed on behalf of Roman Pickens, a wealthy individual from St. Albans and Kanawha County Sheriff at the turn of the twentieth century. Pickens hired

Pike Trowbridge, the same individual who built the first bridge in Tornado, to build a mill in 1884, at which time Lock and Dam No. 3 would have been removed (Wood and Wisman 1988:18). Pickens rebuilt and expanded the mill in 1891 on land formerly owned by Jim Gray. Various people managed the mill until Pickens' death in 1922. Upon his death, Pickens' son-in-law, James Wisman, operated the mill with assistance from notable millwright George Washington Stumm. Wisman built the present concrete dam in the 1920s to feed more water to the gristmill (Wood and Wisman 1988:18-19; Dean 2007:111). Historic aerials place the gristmill as having been located near the existing dam on the current property of 7546 Coal River Road. Historic aerial imagery shows what appears to be the outline of a building foundation along the west bank of the river (refer to **Figure 5**).

The existing concrete dam at Upper Falls was constructed circa-1920 to service the Pickens gristmill. A timber log structure is present immediately adjacent to the concrete dam on the upstream side (refer to **Figure 6**). The log structure may be a remnant of the circa-1855 timber crib navigation dam. However, research suggests that following the closing of the navigation lock and dam system on the Coal River, the timber crib structures were removed from the river by 1882 to facilitate the unobstructed transportation of local timber. The remaining log structure, which is visible when the river's water levels are low, may be from the 1884 Pickens gristmill. As such, the remaining aboveground dam materials, both the concrete dam and log structure, are likely not associated with the Coal River Navigation Company's Lock and Dam No. 3. However, carved features in the bedrock from the Navigation Company's lock and dam construction are still present and visible at times of low water levels.




**Figure 5.** Aerial image from April 10, 1996, showing the foundation outline of historic gristmill, circled in yellow (Source: Google Earth).

After decades of falling into disrepair, it was reported that water had begun to erode the riverbanks, circumventing the concrete dam. A group of local property owners along the river, collectively known as the Upper Falls Improvement Association, raised money and repaired the concrete dam and riverbanks in 1955 (Charleston Daily Mail 1955; Johnson 1956). Less than a decade later, the dam required additional repairs due to damages incurred during the Winter of 1963-1964. The Upper Falls Improvement Association once again led the efforts to repair the dam; however, the nature of the repairs is unknown (Charleston Gazette 1964a, 1964b).

# 2.0 THE CONCRETE DAM

## 2.1 Description of the Dam

GFT (formerly Gannett Fleming) performed a topographic survey in August 2025 to document the layout and condition of the existing dam on the Coal River near the town of Tornado (refer to Sheet C8 in **Appendix A** for a plan view and profile of the dam as observed during this survey). The dam, which has a drainage area of approximately 858 square miles, is a 430-foot-long±, run-of-the-river dam comprised of two distinctly different building materials. The right (looking downstream) portion of the dam (extending from the right riverbank approximately 340 feet to the left) is a vertical concrete wall (refer to **Figure 6**) and the left portion of the dam (extending from the end of the concrete dam, approximately 90 feet to the left riverbank) is comprised of large cut stones (refer to **Figure 7**). The height of the dam varies from less than one foot up to approximately 2.5 feet at its maximum section. The dam has an irregular crest elevation, with the cut stone portion of the dam setting the minimum top of dam at El. 579.3±. The dam has an irregular alignment as it crosses the Coal River. From the right riverbank, the dam angles downstream for approximately 46 feet where the alignment changes and runs perpendicular to the river for approximately 262 feet. From this point the dam angles downstream again for approximately 65 feet. Within this reach, the composition of the dam changes from concrete to cut stone. The alignment then changes again, paralleling the left riverbank for approximately 60 feet where the dam meets a large block retaining wall that may have been part of the original 1850s navigational dam or possibly part of a past gristmill structure. The dam is founded on exposed bedrock, which forms the Upper Falls, for its entire length.

Remnants of a low-height timber wall are present immediately upstream of the concrete dam (refer to **Figure 6** and the plan view on Sheet C8 in **Appendix A**). It is unknown when this timber wall was constructed or its intended purpose. However, it is speculated that it could have been installed to support the operation of the 1884 gristmill located along the western (left) riverbank.

The current concrete and cut stone dam was constructed in the 1920's to improve water flow to the Roman Pickens gristmill. This gristmill was demolished in the 1950's. Consequently, the dam is no longer serving its intended purpose. However, the dam, and the reservoir formed by the remaining dam features, have since served as recreational features for the local community and tourists. According to newspaper articles, repairs were made to the dam in 1955 and again in 1960's. The extent of the repairs are unknown; however, newspaper articles imply the 1955 repairs were to prevent flow around the dam abutments and to repair riverbank erosion.

While not associated with the current concrete dam, the remnants of Lock No. 3, which was part of the 1850's navigational lock and dam system, are located downstream of the dam along the right (eastern) riverbank (refer to **Figure 8**). The lock was excavated into bedrock to establish the required water depth for passing boats through the lock. The operational portion of the lock is reported to be 125 feet long; however, the total length of rock excavation at Lock No. 3 is closer to 250 feet. Excavation into bedrock reached depths up to five feet with the floor of the lock generally ranging between El. 572 and El. 573. The lock channelizes and concentrates flows passing over the Upper Falls, which has resulted in the formation of a scour hole at the base of the falls which is visible in plan view on Sheet C8 in **Appendix A**.

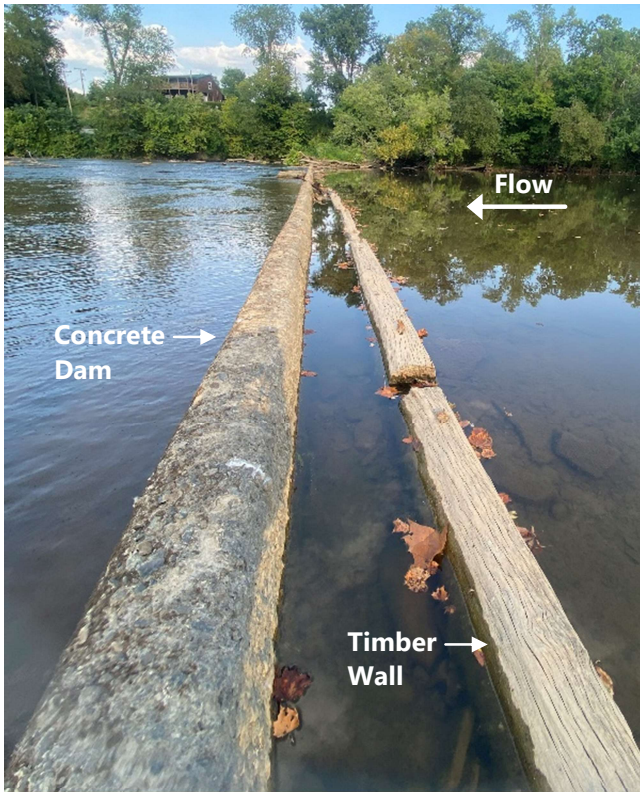



**Figure 6.** View of concrete portion of dam and upstream timber structure during period of low flow. View is looking east towards right abutment. Photograph taken July 2024.

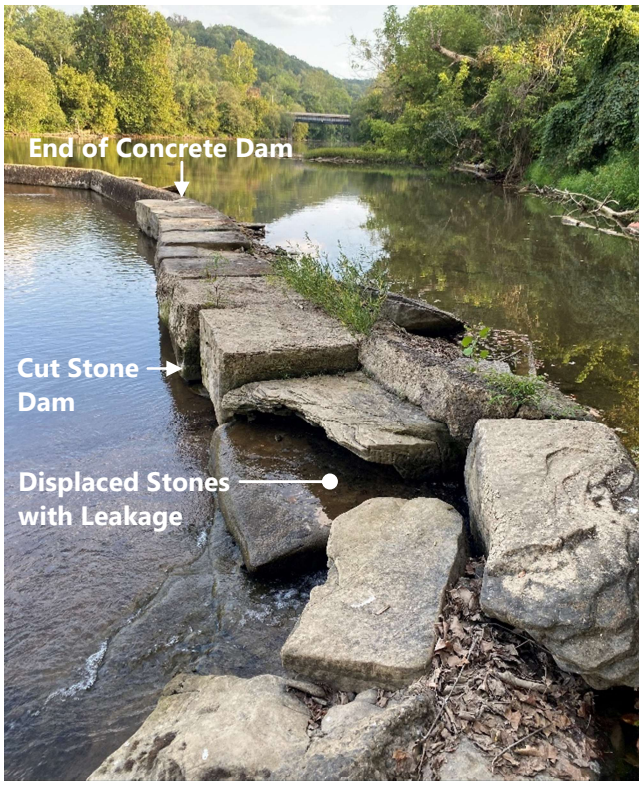



**Figure 7.** View of cut stone portion of dam during period of low flow. View is looking upstream (south), the Smith Creek Road bridge is visible in background. Note displaced stones in foreground resulting in leakage through the dam. Photograph taken July 2024.

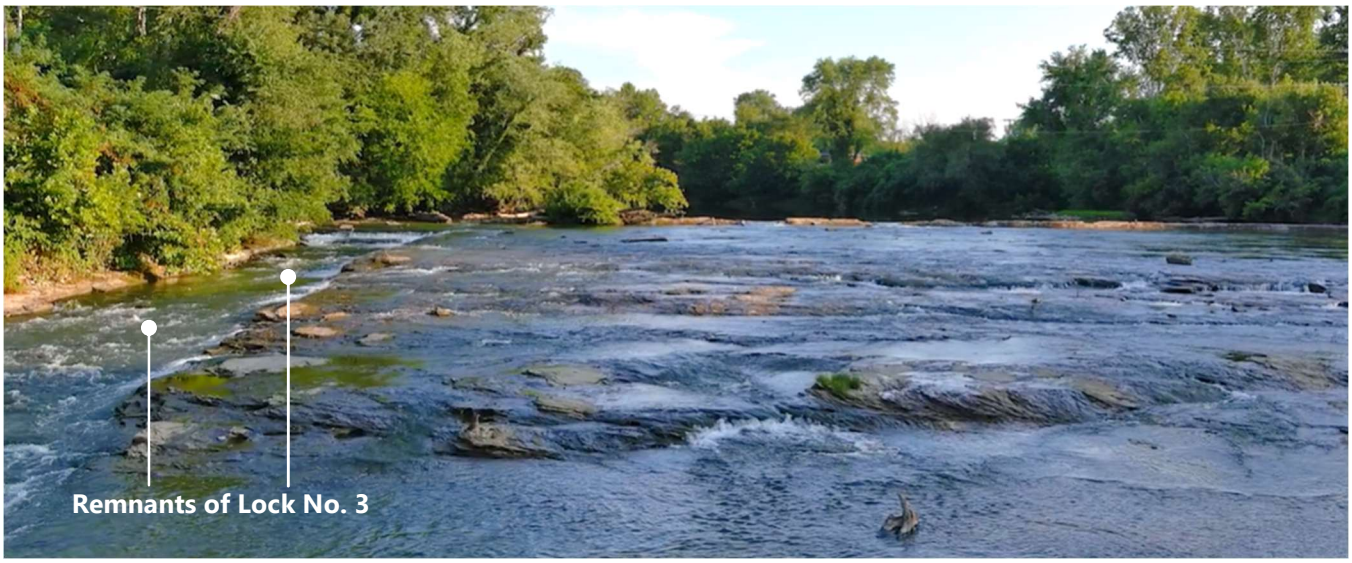



**Figure 8.** Standing near the downstream end of the Upper Falls looking upstream at the dam. Note remnants of Lock No. 3 along left side of photograph. Photograph taken July 2024.

## 2.2 Visual Observations

At the time of the GFT survey on August 19 through 22, 2025, the USGS gauge station on the Coal River at Tornado (USGS Gauge No. 03200500), located immediately downstream of the Smith Creek Road bridge, was reading a gauge height between 9.4 and 9.5 feet, which corresponds to a river flow of approximately 200 cubic feet per second (cfs). The GFT survey correlated this flow to a reservoir level of El. 579.3± (vertical datum of NAVD88) immediately upstream of the dam. Under these flow conditions, the crest and downstream face of the dam were exposed to view, and the structure was accessible by foot traffic.

The concrete portion of the dam has breached in at least five locations, totaling approximately 50 linear feet (over 10 percent of the total length of the dam) which has failed (refer to Sheet C8 in **Appendix A** for a plan view showing the breach locations). The remaining portion of the concrete dam is in an advanced state of deterioration, containing voids, spalls, cracks, exposed aggregate and section loss throughout (refer to **Figures 9, 10, 11, 12 and 13**). The remnants of the concrete dam are anchored to the bedrock by using metal spikes that were either drilled or driven into the bedrock prior to pouring concrete. These spikes are exposed in several areas where the dam has failed. The timber wall immediately upstream of the concrete dam also appears to be anchored to bedrock using metal or wooden spikes, many of which protrude from the top of the wall or from the bedrock in areas where the wall no longer exists (refer to **Figures 12, 13, 14 and 15**).

The stone portion of the dam remnants is constructed of large cut stones that abut each other to form a continuous wall. While the joints between the cut stones appear to be relatively tight and free of gaps, a section near the middle contains displaced stones, resulting in leakage through the dam, and the crest of the wall is depressed in elevation (refer to **Figure 7**).

Based on visual observations made on August 19 through 22, 2025, the dam is in an advanced state of deterioration with no apparent or reported maintenance activities performed since the 1960s. The dam is no longer serving its intended purpose and does not provide a reliable means for maintaining the reservoir pool. In the absence of future maintenance/repairs, it is expected that the dam will continue to deteriorate in an unpredictable manner, which could create new and/or unusual flow patterns that could pose additional threats to public safety and/or erode the riverbanks. It is recommended that the dam either be restored to a safe condition and maintained as such in perpetuity, or the remnants of the dam be completely removed.




**Figure 9.** View of breached sections (three shown) of concrete dam remnants (view is looking upstream). Photograph taken August 2025.



**Figure 10.** Typical view of downstream face of concrete dam remnant near the right (eastern) abutment (view is looking upstream). Note irregular shape of dam crest resulting from loss of concrete. Spalls, cracks, and exposed aggregate observed throughout entire downstream face of the dam. Photograph taken August 2025.

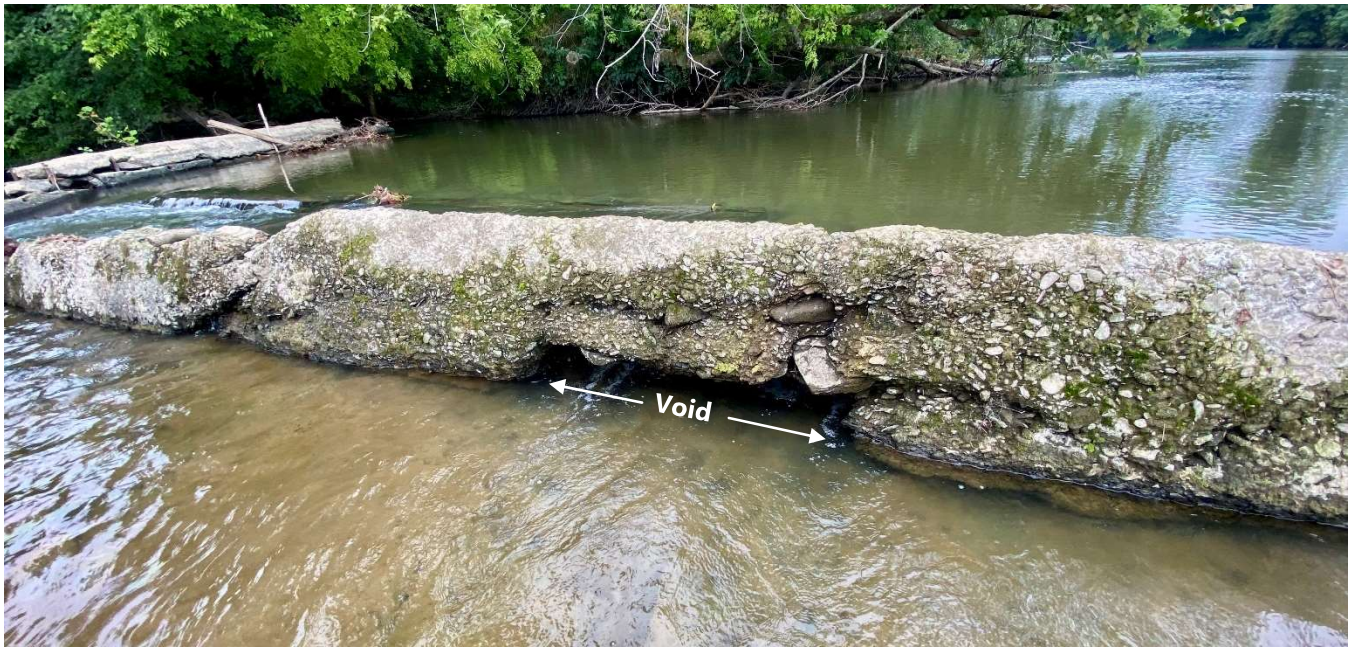



**Figure 11.** View of downstream face of concrete dam remnant near right (eastern) abutment (view is looking upstream). Note large void at base of dam in center of photograph. Photograph taken August 2025.



**Figure 12.** View of breach in concrete dam near right (eastern) abutment (view is looking east). Note metal spikes protruding from bedrock in area of breach (circled in red). Photograph taken August 2025.



**Figure 13.** View of metal spike (circled in red) protruding from top of concrete dam. Note extreme concrete deterioration throughout. Photograph taken August 2025.



**Figure 14.** View of exposed metal spikes in timber wall. Photograph taken July 2024.



**Figure 15.** View of exposed metal spike protruding from bedrock. Photograph taken July 2024.

## 2.3 Ownership

Originally constructed by James Wisman in the 1920s to feed more water to the gristmill, which was owned by Roman Pickens, the present-day ownership of the dam is unclear. The remnants of the gristmill (refer to **Figure 5**) are located on Parcel 20-16-015A-0097-0000 which is currently owned by Terry & Nora Smart according to the West Virginia GIS Technical Center (https://mapwv.gov); however, deed research carried out by the District has failed to identify legal ownership of the dam (i.e., the dam itself is not mentioned or otherwise tied to the deed). Through the public scoping process of the Plan-EA, including the public scoping meeting held on July 21, 2025, no individual or entity has identified themselves as the lawful owner of the dam. It is noted that neither the District, Kanawha County, nor the West Virginia Division of Natural Resources are interested in, or have the financial means, to own, operate and maintain the dam at Tornado. Likewise, the town of Tornado is not an incorporated entity, and without a governing body, has no ability to own, operate or maintain the dam. Additionally, since the dam is less than six feet in height, the West Virginia Department of Environmental Protection has no regulatory authority over the structure. The dam is therefore considered to be an "orphaned" structure.

## 3.0 PUBLIC SAFETY AND LIABILITY

Dams and their impoundments can be popular places, even if located in remote areas. The majority of visitors at a dam site are usually members of the public who wish to use the site for fishing, boating or swimming. The dam at Tornado is no exception. Use of the Coal River by the local community and tourists at the Upper Falls is well-documented. As noted during the Public Scoping Meeting held on July 21, 2025, the rock outcrop that forms the Upper Falls and the sandbars and scour hole located below the falls are popular spots for outdoor enjoyment, including sunbathing and swimming. Unauthorized activities, such as public drinking, were also noted during the public meeting. There has also been a recent effort to encourage the public to use the Coal River Water Trail, which encompasses over 88 river miles along the Coal River, Little Coal River and the Big Coal River, which results in increased public interaction with the dam at Tornado.

A newspaper search has identified at least 18 drowning deaths at the Upper Falls dating back to 1919. For many of these incidents, it was unclear if the death was directly attributed to the dam; however, several deaths have been attributed to the unusual flow patterns and currents associated with the remnants of Lock No. 3 and the downstream scour hole.

### 3.1 General Responsibility of Dam Owners

Under state and federal law, dam owners are responsible for maintaining their dams in a safe condition, and in general, responsible for taking whatever actions necessary to avoid injury to people and property damage. Where conditions cannot be altered to create a safe public environment, the dam owner is responsible for adequately warning the public of the potential danger. Potential liability issues for dam owners include personal injury and liability, flood damage to upstream properties by storage of flood waters, and downstream flood damage caused by the sudden release of stored water from a failure of the dam or intentional draining of the impoundment. For the dam at Tornado, which is a low-head run-of-the-river dam, no damage would be expected to result from stored water or from a failure of the dam, as the resulting flood wave would be expected to be nominal and remain within the banks of the Coal River.

As previously noted, there is no apparent owner of the dam; however, this does not necessarily mean there is no liability associated with the dam. As an example, the Herald News (HearldNewsOnline.com) reported in July 2007 on a lawsuit filed by the family of a man and woman who drowned at a low-head run-of-the-river dam in Wilmington, Illinois. A young boy, four years of age, wandered away from a public park and fell into the Kankakee River just upstream of the Wilmington Dam. While the boy survived, his mother, uncle and a good Samaritan who went into the river to save the boy, all drowned in the hydraulic roller below the dam. The lawsuit was filed against the City of Wilmington and the Wilmington Island Park District (neither of which reported ownership of the dam or the waterway), claiming these entities acted willfully and wantonly in their operation of the park by failing to block access to the dam, failing to post adequate signs, and failing to supervise a known dangerous area. While the park district ultimately won the lawsuit, they were forced to spend over $180,000 on legal fees.

### 3.2 Public Safety Concerns

On August 19 through 22, 2025, a field survey was conducted of the dam and upstream/downstream riverbeds. Based on observations and measurements taken during this field survey, the following possible hazardous conditions were observed:

1. Hydraulic roller at the downstream face of the dam. The most significant risk to public safety at low-head dams is the hydraulic roller phenomenon that occurs at the downstream face of the dam under certain flow conditions. This rotational flow phenomenon is created when the tailwater rises to a point where it begins to submerge the downstream face of the dam, creating a submerged hydraulic jump. In most cases, the flow approaching and passing over the dam may appear smooth and unassuming, except for bubbles rising to the surface immediately downstream of the dam. These conditions may provide boaters, swimmers or fishermen with a false sense of security, failing to recognize the presence of the dangerous hydraulic roller. Water plunging over the downstream face of the dam, in combination with tailwater, can create a condition that takes any object, including a person, to the bottom of the water column, releases it to the surface, draws it back to the face of the dam, and then pushes it back to the bottom. This cycle is a function of river flow and can continue for extended periods of time. The plunging water over the dam can introduce air bubbles into the water column, decreasing buoyancy by as much as one-third. The victim may therefore have a difficult time staying afloat, even with a personal flotation device (i.e., life jacket). Reduced buoyancy, combined with the recirculating current, creates a nearly inescapable drowning machine.

   A hydraulic roller was observed at the dam near the town of Tornado on July 21, 2025 (refer to **Figure 16**). At the time of the photograph, the USGS gauging station near the Smith Creek Road bridge was reading approximately 13.2 feet with a river flow of approximately 6,050 cfs. Note that the hydraulic roller was not present in the areas where the concrete dam has failed (one such area is denoted with a red arrow in **Figure 16**), providing insight into the hydraulic conditions that would exist under these flow conditions with the dam removed.




**Figure 16.** Hydraulic roller occurring at dam on the Coal River near the town of Tornado (view is looking west). Note area where hydraulic roller is not present (denoted with red arrow) which coincides with an area where the concrete dam is breached. Photograph taken on July 21, 2025, at approximately 2:45pm.

2. Turbulent and unusual flow patterns within and downstream of the remnants of Lock No. 3. The rock cut that remains from the construction of Lock No. 3 creates nearly vertical walls up to five feet high in areas. These vertical walls pose a fall hazard. Under higher river flows, these vertical drops may not be visually apparent, allowing an individual to inadvertently fall into deep water. The configuration of the lock also collects and channelizes flow, creating a zone of concentrated high velocity and unusual flow patterns capable of trapping or carrying an individual downstream where a scour hole exists. Scour holes are typically formed by recirculating water, and under certain flow conditions, this recirculating pattern could hold an individual in the current for extended periods of time, potentially leading to drowning.

3. Submerged hazards. Submerged hazards can capsize boats and injure swimmers. The field survey conducted in August 2025 identified multiple locations where metal spikes are protruding from either the concrete dam, timber wall or bedrock (refer to **Figures 12, 13, 14 and 15**). These features pose an impalement hazard to individuals using the river. Under certain flow conditions, these hazards may not be visible.

4. Strainers and excessive seepage paths through the dam that can trap an individual. Strainers can be natural or manmade features that have openings that are large enough to allow flow to pass, but small enough to prevent larger objects from passing through, including an individual. Examples could be a trash rack over a pipe intake or branches of a fallen tree within the waterway. In these cases, the larger object is pinned against the upstream face of the strainer and held in place by the pressure of the water which is trying to pass around the obstruction and pass through the strainer. An individual caught in this situation could be held underwater, leading to drowning. The breaches in the dam (refer to **Figure 9**) and/or voids that pass through the dam (refer to **Figure 11**) could create conditions where a boat or individual could become trapped, lodged or pinned in the opening and held underwater.

5. Slippery surfaces on dam structure, shorelines and steep riverbanks. Slippery surfaces on dam structures and along the river shoreline and steep riverbanks can cause visitors to slip and fall into the river. The wet river environment coupled with marine growth can exacerbate slippery conditions. These conditions can also hamper emergency rescue/recovery activities. It is noted that a boat ramp is located upstream of the dam along the right (eastern) side of the river just downstream of the Smith Creek Road bridge which can be used by emergency personnel to access the river. However, the riverbanks immediately adjacent to the dam are steep, with vertically stacked stone retaining walls located at the left (western) abutment.

6. Condition, location and/or absence of warning signs and buoys. Signs and buoys can be an effective way to create exclusion zones and warn the public of the hazards associated with low-head dams and their appurtenances. One warning sign reading "Danger, Dam Ahead, No Safe Passage" was observed at the boat ramp along the right (eastern) side of the river, approximately 70 feet downstream of the Smith Creek Road bridge (refer to **Figure 17**). This sign is set back approximately 50 feet from the edge of water and can be obscured by vegetation when viewing from the river, making it ineffective in warning the public of the downstream dam. No other signs or buoys were observed.




**Figure 17.** View of warning sign from edge of water. Note vegetation can obscure the sign when viewing from the river. Inset shows close-up view of warning sign. Photograph taken July 2025.

7. Public access. Restricting or controlling public access is a means of improving safety at a dam site. Features such as fences, handrails, buoys and other barriers can be an effective means to discourage access to unsafe areas. Lack of such safety barriers can be a safety hazard, especially for children. The area around the dam consists of steep riverbank slopes which naturally limit access to the river. However, the steep slopes themselves can create a slip/fall hazard. Installing additional fencing at the top of bank could help to eliminate a fall hazard while also directing pedestrians to planned river access locations.

8. Ability to portage around the dam. A portage route is in place to allow boaters to safely bypass the dam. The take-out location is the boat ramp along the right (eastern) riverbank immediately downstream of the Smith Creek Road bridge. The portage route continues downstream, paralleling Pettigrew Lane within Meadowood Park, and eventually reentering the Coal River downstream of the Coal River Group visitor center building. However, the portage take-out location and overland route is poorly marked, and it may not be obvious to boaters who are not familiar with the area. Maps of the Coal River Trail can be found on the Coal River Group website (https://www.coalrivergroup.com). These maps identify put-in and take-out locations for boaters (refer to **Figure 18** for the map that covers the Coal River near the town of Tornado). While this map identifies the dam at Tornado, the put-in location at Meadowood Park, and references the take-out location as "the bridge near Meadowood Park", the map is at a scale that does not give boaters a clear understanding of the portage route. Furthermore, the map identifies a "sand beach take-out" location on the left (western) bank of the river, which could be confusing to boaters looking for the portage take-out location which is on the right riverbank.

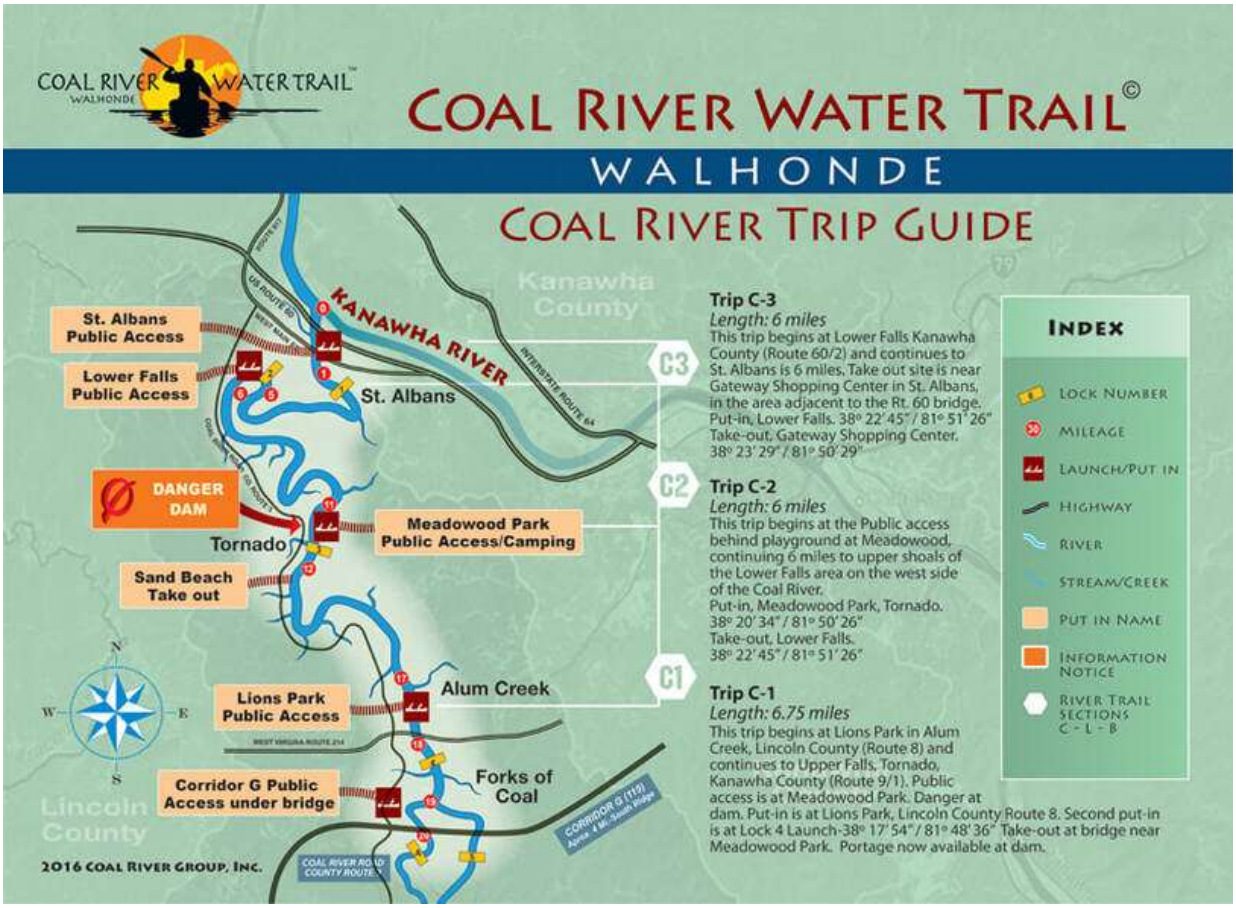



**Figure 18.** Map of the Coal River Trail showing river features and boat put-in locations. Source: https://www.coalrivergroup.com

## 3.3 Potential Public Safety Improvements

The following provides suggested improvements that can reduce the danger and/or eliminate existing public safety hazards at the dam.

### 3.3.1 Remove Dam

Complete removal of the dam is an obvious solution for enhancing public safety since nearly all the hazards associated with the dam are eliminated. Dam removal projects should consider the riverine environment (i.e., fish and wildlife habitat, aquatic movement, etc.), the impact on recreational activities and the people who live nearby, and any sediment contamination/mobilization concerns. Solving all these issues often means that compromises may need to be made. Removal of a dam should be considered a permanent action and not an interim solution with the expectation that a new dam can or will be constructed at the same location later, as the current climate for constructing new dams is not favorable and obtaining a permit to reconstruct the dam can be difficult to obtain or no longer possible. Even if a dam previously existed at a proposed site, there is no guarantee that a permit can be obtained to construct a new dam.

For larger dam removal projects, a phased lowering approach may be considered over a period of months or even years. The benefit of a phased approach that lowers the reservoir level in incremental stages is that the upstream

reservoir, and any sediment deposits which are present, can be gradually exposed and allowed to stabilize with vegetation, reducing the risk of erosion and mobilizing sediment. Sedimentation issues are often prominent drivers of project costs, especially if the sediments contain hazardous pollutants. For the dam at Tornado, which is less than 2.5 feet high, a phased demolition approach would not be required. Using the upstream boat ramp near the Smith Creek Road bridge, the dam is easily accessible by construction equipment. Moderately sized equipment, such as a tracked excavator and offroad dump truck, could perform the work. **Figure 19** shows an example of a long-arm excavator, equipped with a hydraulic rock hammer, removing a low-head concrete dam. Similar type equipment would be expected to be adequate to remove the dam at Tornado. Concrete demolition could be disposed of offsite, or the material could be used to fill in the scour hole below the remnants of Lock No. 3 provided the concrete does not contain metal spikes, reinforcing, or other objectionable debris that could pose a public safety hazard.



**Figure 19.** Example of a low-head concrete dam being removed by use of a long-arm excavator equipped with a hydraulic rock hammer.

It is not uncommon for sediment accumulations to be encountered upstream of a dam, including low-head dams. If a dam were to be demolished over a relatively short period, the sediment deposits could be exposed, increasing the potential for this material to be eroded and carried downstream. This action could result in increased turbidity, reducing downstream water quality, and depending upon the volume of sediment released, adversely impact aquatic life and habitat. Furthermore, if the sediment deposits contain hazardous chemical constituents, additional measures will likely be required to prevent adverse environmental impacts. Such measures could include removing the contaminated sediment prior to breaching the dam or implementing robust stabilization measures to lock the contaminated sediment in place to prevent it from migrating downstream. A sediment survey performed at the dam on the Coal River at the town of Tornado found very little sediment deposited upstream of the dam. The submerged sediment that is present is located below the elevation of the rock outcrop on which the dam is founded. Consequently, removal of the dam would not expose the sediment, reducing the likelihood of mobilizing this

sediment. Refer to Sections 5.0 and 6.0 of this report for additional discussions on the sediment depth survey and sediment sampling program, respectively, implemented as part of this Plan-EA.

Removal of the dam eliminates the man-made barrier to aquatic movement, restoring river conditions to those that existed prior to the original construction of the dam. This action would support previously constructed upstream river restoration activities, allowing migratory and local fish species to move freely up and down the river system. Upstream restoration measures constructed between October 2011 and February 2012 included 21 structures throughout a 1.3-mile stretch of the Little Coal River. These restoration activities included practices such as cross vanes, boulder clusters, and flow deflectors, to enhance fishery habitat, transport sediment, and maintain navigation for recreational boating. A monitoring report dated April 23, 2013, found these structures to be performing as intended after a year of service (Green Rivers 2013).

Depending on the height of the water column impounded behind a dam, removal of the dam may expose upstream land that had not been exposed since the original construction of the dam. Depending on the topography and amount of exposed land, stabilization of these exposed areas may be required. The existing dam at Tornado ranges in height from approximately one foot to up to 2.5 feet at its maximum cross section. The dam is founded on a rock outcrop that essentially forms a natural dam across the river. Consequently, removal of the dam would not lower river levels any lower than the elevation of the natural rock outcrop. A hydraulic analysis of the Coal River shows the removal of the dam remnants would impact river levels over six miles upstream of the dam under the 50 percent exceedance flow (i.e., 700 cfs according to the USGS stream gauge in Tornado). Under these flows, the hydraulic model shows river levels will be lowered by approximately one foot at the Smith Creek Road bridge. The reduction in water depth decreases in the upstream direction, eventually reaching a reduction of less than one tenth of a foot approximately six miles upstream. Due to the steep riverbank slopes, the riverbank area that will be exposed by removing the dam remnants is minimal and the lowered river levels will not be significantly different from the conditions that exist during low flow periods of the year. Refer to Section 10.0 for additional discussion on the hydraulic analysis.

Under the dam removal option, the public safety concerns associated with the remnants of Lock No. 3 and the downstream scour hole would remain. Consequently, mitigation measures are recommended to reduce the hazardous flow patterns within and downstream of the lock. Mitigation options could include flattening the vertical sides of the lock to reduce the fall hazard and/or filling in the lock and scour hole to reduce flow depths and unusual flow patterns. The cut stones that form the left side of the dam could be used to fill in the lock, providing a more natural solution compared to using manmade material such as concrete. The lock creates an opportunity to strategically place the cut stones to create pools and weirs that enhance fish movement over the Upper Falls. The unique geometry of the lock and its configuration with respect to the Upper Falls and the right riverbank, make hydraulic modeling of the lock challenging with traditional hydraulic models. To fully understand the flow patterns in and around the lock, including the downstream scour hole, a three-dimensional Computational Fluids Dynamics (CFD) model is recommended to evaluate and confirm the effectiveness of the proposed improvements at eliminating dangerous flow conditions under a wide range of flow conditions. CFD modeling could be performed as part of the Plan-EA or performed in the future during the preliminary/final design phase.

### 3.3.2 Retain Dam

As discussed in Section 2.2, the existing dam is in an advanced state of deterioration. Should the dam be retained, it should be repaired and brought into a safe condition that complies with applicable dam safety rules and regulations and eliminates the public safety concerns associated with submerged hazards (such as metal spikes) and strainers. For options that retain the dam, public safety improvements are recommended to address the concerns identified in Section 3.2.

The most cost-effective measures for improving public safety often include the addition of signs, buoys and fences to warn the public of the dangers associated with low-head dams and to create exclusion zones to deter access to the dam. From the perspective of a boater approaching the dam from upstream, the dam may not be readily visible depending upon the river level. Upon passing over the dam, the boater can be drawn into the hydraulic roller, if present, possibly leading to drowning, or the boater could be injured from the fall over the dam. For these reasons, it is important that warning signs and buoys be placed to create an exclusion zone and direct boaters away from the dam. Signage is also recommended at the left and right abutments and downstream of the dam to warn individuals who may be approaching the dam on foot. To be effective, buoys and signs must be clearly visible, located at appropriate places, provide a clear message of the potential hazard(s), and be maintained. Although buoys warn of an impending danger, they may not convey sufficient warning and should be used in conjunction with well-placed signs.

Signs, if properly placed, are generally read and understood by visitors. The warning message on the signs should be strong, implying the existence of a life-threatening serious condition. Signs containing universal symbols are also recommended to convey the warning message to non-english speaking individuals. For the dam at Tornado, signage is recommended upstream of the Smith Creek Road bridge to alert boaters of the presence of the dam and to direct river traffic to the portage location along the right riverbank. Buoys can be staggered, with the leftmost buoy farther upstream than the rightmost buoy, which further directs and funnels boaters towards the portage take-out location along the right riverbank. It is recommended the guidelines published by the U.S. Army Corps of Engineers and the U.S. Coast Guard be followed for the installation of signs and buoys. It is also recommended that the portage route be clearly marked in the field and any mapping denoting the portage route, including take-out and put-in locations, be clearly identified and described so that boaters, and specifically boaters who are not familiar with the river, can easily find and follow the portage.

Installation of cables or barriers across the river is another option for preventing boaters and people from coming in contact with the dam. However, these features can collect and trap floating debris resulting in a strainer-type hazard. If debris is allowed to accumulate, the cable crossing can fail, creating an uncontrolled release of the collected debris. Since such features can create additional public hazards, cable crossings are not recommended.

Structural modifications can be made to the dam to reduce or eliminate the dangerous hydraulic roller that occurs under certain flow conditions. There are several case studies of structural modifications at low-head dams that have achieved this objective which could be applicable to the dam on the Coal River at the town of Tornado. The following paragraphs describe several alternatives which could be implemented to eliminate the hydraulic roller.

> Reshaping the downstream face of the dam. One of the most common modifications involves reshaping the downstream face of the dam by essentially infilling the area where the hydraulic jump would otherwise

occur. Methods used to reshape the downstream face of the dam have included, but are not limited to, placement of large-diameter boulders or grout bags and construction of concrete steps. These features are placed against the downstream dam face and normally extend the entire length of the dam. The result is a rough incline with a slope of 3H:1V or flatter, similar to the standard design for a baffled chute spillway (refer to **Figures 20 and 21** for reshaping examples using riprap and conventional concrete steps, respectively). Reshaping the downstream face with large diameter boulders is a popular solution due to conventional construction techniques and the use of natural materials (i.e., boulders) that are readily available in most areas. However, for the dam at Tornado which sits atop an exposed rock outcrop, the use of boulders may require excavation of the bedrock to anchor the boulders and provide resistance to movement during high flows. Rock excavation can be expensive and would need to be completed in a manner that would not damage or otherwise compromise the dam.

Installing boulders or steps immediately downstream of a low-head dam can be effective at improving public safety by eliminating or reducing the hydraulic roller; however, these modifications may not improve aquatic movement over or around the dam, which is a goal of the Plan-EA.

Traditional fish passage facilities, such as Denil or vertical slot fishways, have recently fallen out of favor with the U.S. Fish and Wildlife Service. These concrete structures are typically designed to create flow conditions that are only suited for a few types of fish species. Furthermore, these structures have a history of poor performance, which can be attributed to several factors, the most significant of which involves the inability for fish to find the entrance of the fishway.



**Figure 20.** Example of reshaping the downstream face of a low-head dam using slush grouted riprap.



**Figure 21.** Example of reshaping the downstream face of a low-head dam using conventional concrete steps.

Recent trends in fish passage design are moving towards nature-like fishways. These structures are intended to mimic natural streams and rivers and are constructed of natural material (such as boulders, riprap, etc.) to the greatest extent possible. There are two major types of nature-like fishways, the by-pass channel and rock ramp fishway. By-pass channels, as the name implies, involves the construction of a low-gradient channel around the obstruction (such as a low-head dam). The channel would likely contain a series of pools and riffles, gradually rising in elevation as needed to overcome the height of the dam.

A disadvantage of the by-pass channel is the amount of space which is needed to construct the facility and the cost. For the dam at Tornado, the adjacent riverbanks are high and slope steeply towards the river. Consequently, construction of a by-pass channel around the dam would require excessive excavation into either the left or right riverbank, likely conflicting with Coal River Road along the left abutment or existing infrastructure within Meadowood Park along the right abutment, making the by-pass channel an unlikely candidate for improving aquatic movement around the dam.

The rock-ramp fishway is unique in that it infills the entire river downstream of the dam with rock fill and strategically placed boulders, to create a wide range of flow conditions (refer to **Figure 22**). This type of fishway generally consists of a series of rock chevrons that are designed to be slightly lower in the center with the left and right ends of each chevron rising in elevation. Each chevron is set at an elevation that is slightly higher than the one before, with the number of chevrons determined by the height of the obstruction that needs to be overcome. This configuration creates a wide range of flow conditions throughout the rock-ramp fishway that can pass nearly all types of aquatic species. Deeper, faster moving

water in the center of the structure allows for passage of stronger swimming fish, while shallower, slower moving water is created along the edges of the fishway that is suitable for weaker aquatic species.




**Figure 22.** Example of rock ramp fishway installed downstream of a low-head dam having a height of approximately 13 feet. Right photograph shows the low-head dam prior to installation and left photograph shows the rock ramp fishway in place.

As an added benefit in comparison to hardened fishways (such as the Denil and vertical slot fishways), the rock ramp fishway spans the entire width of the river, making it easy for aquatic species to find and enter the fishway.

Movable Crest Dam Concept. By definition, movable crest dams have the ability to vary the crest elevation of the dam from a fully down position to replicate natural river flow conditions to a partial or fully up position to raise the upstream water levels. Movable crest dams can be operated to change the hydraulic conditions downstream of the dam, reducing or eliminating the dangerous hydraulic roller. Three types of dams with controlled crests have been widely used for controlling water levels and creating temporary low-head impoundments. Each dam type can be used to replace a fixed crest low-head dam and include (1) a hydraulically operated steel bascule gate dam, (2) an inflatable rubber dam, and (3) a bascule gate dam operated with inflatable rubber bladders. All three of these controlled-crest type dams (refer to **Figure 23**) have been used successfully in river environments.



**Figure 23.** Examples of movable crest dams. Top photograph shows metal bascule dam. Bottom left photograph shows inflatable rubber dam and bottom right photograph shows a bascule gate dam operated with an inflatable rubber bladder. All dams are shown in the fully up position.

Each movable crest dam type requires a significant amount of infrastructure and maintenance to ensure the structure performs as intended. The steel bascule gate dam is hinged at the bottom, allowing the gate to rotate 90 degrees from a down position to a fully up position and is typically operated with a series of hydraulic pistons. The inflatable rubber dam consists of a sealed tube fabricated from heavy-duty, nylon-reinforced rubber attached to a concrete foundation. The rubber tube is filled with air supplied from a pump house located along the shoreline to raise or lower the dam. The bascule gate dam operated with an inflatable rubber bladder is similar to the steel bascule gate dam, only with hydraulic piston operating system switched to an inflatable bag that is filled with air.

For the dam on the Coal River at Tornado, the exposed bedrock on which the dam is founded, provides an ideal foundation for a movable crest dam. However, movable crest dams are expensive to design and construct, requiring a significant amount of infrastructure, including but not limited to, electrical service, hydraulic systems, air pumps and associated piping to each inflatable bag, monitoring equipment, control buildings and associated sitework. The nature of these facilities requires continuous maintenance and upkeep to ensure the dam functions as intended. Due to high initial costs and the absence of a dam owner who would be financially responsible for maintaining the dam, the movable crest dam option is not considered to be a feasible solution for retaining the dam.

Manmade canoe chute and standing waves. The area downstream of a low-head dam can be reconfigured to transform the dam from being a boating hazard to a recreational asset by directing canoers and kayakers approaching the dam to a man-made standing wave and/or white-water channel. A standing wave option would feature a break in the dam, channelizing flow to what would be described as a man-made rapid, which may require alteration of the bedrock that forms the Upper Falls. Under certain flow conditions, a standing, or stationary, wave may be able to be achieved, allowing surfers to ride for minutes at a time. Standing waves have been created on the Great Miami River in RiverScape Metropark and Eastwood Metropark in Dayton, Ohio. The white-water channel option would feature a series of carefully designed artificial rapids and pools without encountering a hydraulic roller. One such installation is located within Confluence Park in Denver, Colorado (refer to **Figure 24**). At a minimum, these types of dam modifications would require (1) a significant design effort, including computational fluid dynamics (CFD) modeling and possibly physical hydraulic modeling, to ensure the standing wave and canoe chute are stable and do not create dangerous currents under a wide range of flow conditions, (2) repair of the existing dam to remain which is beyond the limits of the standing wave or canoe chute, (3) installation of navigational aids in the upstream channel directing boaters to the standing wave or canoe chute, and (4) warning signs alerting the public of the potential risks associated with the dam and standing wave or canoe chute.



**Figure 24.** Example of a canoe chute located in Confluence Park in Denver, Colorado.

While these features can be engineered to reduce or minimize unsafe conditions, public safety concerns remain, which may be exacerbated by the increased public attention that such features may receive. For these reasons, creation of a canoe chute and/or standing wave are deemed to not meet one of the main goals of the Plan-EA which is to improve public safety.

Under the retain dam option, the public safety concerns associated with the remnants of Lock No. 3 and the downstream scour hole would remain. Consequently, mitigation measures, such as those described at the end of Section 3.3.1 are recommended to reduce the hazardous flow patterns within and downstream of the lock.

## 4.0 TOPOGRAPHIC AND BATHYMETRIC SURVEYS

GFT performed topographic and bathymetric surveys within the project study area between August 19, 2025, and August 22, 2025. The survey encompassed over 13 acres, including the concrete dam, the Upper Falls, and the riverbed for approximately 1,000 feet upstream of the dam to the Smith Creek Road bridge and approximately 1,600 feet downstream of the dam to a point just upstream of where the river bends to the right. Numerous technologies were used to survey and develop a comprehensive basemap of the study area. These included conventional Global Positioning System (GPS) rod survey for exposed areas, including the Upper Falls; the use of an aerial drone for exposed areas and for aerial imagery; and the use of a drone boat for bathymetry (refer to Section 4.1 for additional information on survey equipment and procedures). Information outside of the detailed survey limits was supplemented with the latest available LiDAR data. The survey was conducted during a period of low flow in the Coal River (the USGS stream gauge at Tornado was reading a gauge height between 9.4 and 9.5 feet and a flow rate between 190 and 200 cfs), which allowed the survey to capture the entire riverbed, including the remnants of Lock No. 3, that would otherwise be inaccessible during higher flow conditions. Sheet C1 in **Appendix A** shows where each survey technology was used and the location and density of shots obtained to develop the basemap of the study area. The basemap developed for the study area is shown on Sheets C2 and C3 in **Appendix A**. This same basemap information is repeated on Sheets C4 and C5 with the aerial imagery taken during the aerial drone survey used as a background image.

The bathymetric survey also included eight river cross sections located upstream of Smith Creek Road bridge, extending over 2.2 miles upstream of the study area. These cross sections were taken to support the hydraulic analysis and to assess the impact the dam removal option would have on upstream water depths (refer to Section 10.0 for additional discussion related to the hydraulic analysis).

### 4.1 Horizontal and Vertical Control

Horizontal and vertical survey control was established using static GPS procedures using a survey grade Leica GPS unit. An NGS OPUS solution was obtained for horizontal and vertical control. Horizontal datum is North American Datum of 1983 (NAD83) (2011), West Virginia State Plane Coordinates, South Zone, US Feet, and vertical datum is North American Vertical Datum of 1988 (NAVD88), US Feet.

A DJI Mavic 3 Enterprise unmanned aerial vehicle (UAV, or drone) mapped the entire site and derived photogrammetric products including 1-inch orthoimagery, and a 3D point cloud to supplement bathymetric and conventional survey data. These datasets were tied to the above-mentioned coordinate system via surveyed ground control points. A CHCNAV Apache 3 Pro unmanned surface vehicle (USV, or RC boat) equipped with single-beam echosounder was used to collect bathymetric data upstream of the dam and downstream of the dam where water depths allowed. Both vehicles used GNSS RTK for survey-grade accuracies.

Conventional survey techniques were used to supplement the drone and bathymetric data, and sediment thickness was obtained using manual push-probe methods using a survey rod.

GFT established three survey control points for the project, all of which are in upland areas within Meadowood Park along the east side of the Coal River. These points are summarized in **Table 1** and are all located in asphalt/macadam areas (refer to Sheet C1 in **Appendix A** for the location of each control point).

**Table 1**
**Established Survey Control**

| Control Point Designation | Description | Coordinates (feet) | | Elevation (feet) |
|---|---|---|---|---|
| | | Northing | Easting | |
| CP1 | Mag Nail in Macadam | 490,685.85 | 1,727,800.18 | 611.01 |
| CP2 | Mag Nail in Macadam | 490,078.08 | 1,727,759.95 | 611.47 |
| CP3 | Mag Nail in Macadam | 489,652.54 | 1,727,407.86 | 613.75 |

### 4.2 Survey Observations

Over 1,600 conventional GPS rod survey shots were taken to define the Upper Falls, including the existing dam remnants and the remnants of Lock No. 3. The dam has an irregular crest elevation, with the cut stone portion of the dam near the left abutment setting the minimum top of dam at El. 579.3±. The bedrock along the alignment of the dam varies from El. 577.5± to El. 579.0± (refer to Section 2.1 for additional discussion related to the description of the concrete dam). The rock ledge that forms the Upper Falls, continues upstream of the dam along the right side of the river, spanning the entire width of the river near the dam and running on a diagonal alignment towards the boat ramp just downstream of the Smith Creek Road bridge. At the time of the aerial drone survey, water clarity and shallow water depths allowed this bedrock feature to be clearly seen (refer to Sheet C4 in **Appendix A**). The top of this bedrock feature contains a relatively uniform surface, generally ranging between El. 577.0± and 577.5±. Deeper water, reaching El. 570±, is present within the study area upstream of the dam between the rock ledge and the left riverbank. From the Smith Creek Road bridge, moving in a downstream direction, the width of the deeper water is naturally reduced by the bedrock ledge. At a point just downstream of where Falls Creek enters the Coal River, the bedrock ledge spans the entire width of the Coal River, pinching off and eliminating the deeper water along the left riverbank.

Low flow conditions at the time of the survey allowed manual entry into the remnants of Lock No. 3. The survey found the bottom of the lock (i.e., mitre sill as shown in **Figure 4**) to vary between El. 572 and 573. Assuming the height of the original navigational dam is 15.6 feet above the mitre sill (Dean 2007:71), the upstream pool created by the original 1850s navigational dam would have been around El. 588 to El. 589 (approximately 9 to 10 feet higher than the crest of the existing concrete dam), placing the pool elevation near the top of the existing riverbank. **Figure 25** compares the pool elevation which was reportedly formed by the 1850s navigational dam (shown as a dashed red line) to the pool formed by the existing concrete dam which was observed during the GFT survey in August 2025 (shown as a solid blue line).

As discussed in Section 1.0, the original timber crib lock and dam structures were securred in place by hewing parallel keyways into the bedrock which received the bottom timber of the structure. This anchoring system, in combination with metal spikes, provided sliding resistence against the pressure of the upstream reservoir, helping to hold the dam in place. These parallel keyways can be seen in the aerial imagery taken in August 2025. Two parallel keyways are cleary visible along the left side (looking downstream) of Lock No. 3 (visible within the red box in **Figure 26**). The aerial imeragy also identified two parallel keyways originating approximately 40 feet downstream from the upper end of Lock No. 3 and running perpenditular to the river. The keyways are approximately 11 feet apart, which is generally consistent with the reported size of the timber crib cells (Dean 2007:72) and extending this alignment to the left side of the river would put the left abutment of the dam in the vicinity of the vertical cut stone

wall and just upstream of the gristmill. These keyways appear to represent the original alignment of the 1850s navigational dam; however, with no historical documentaion available on Lock and Dam No. 3, this is speculation.

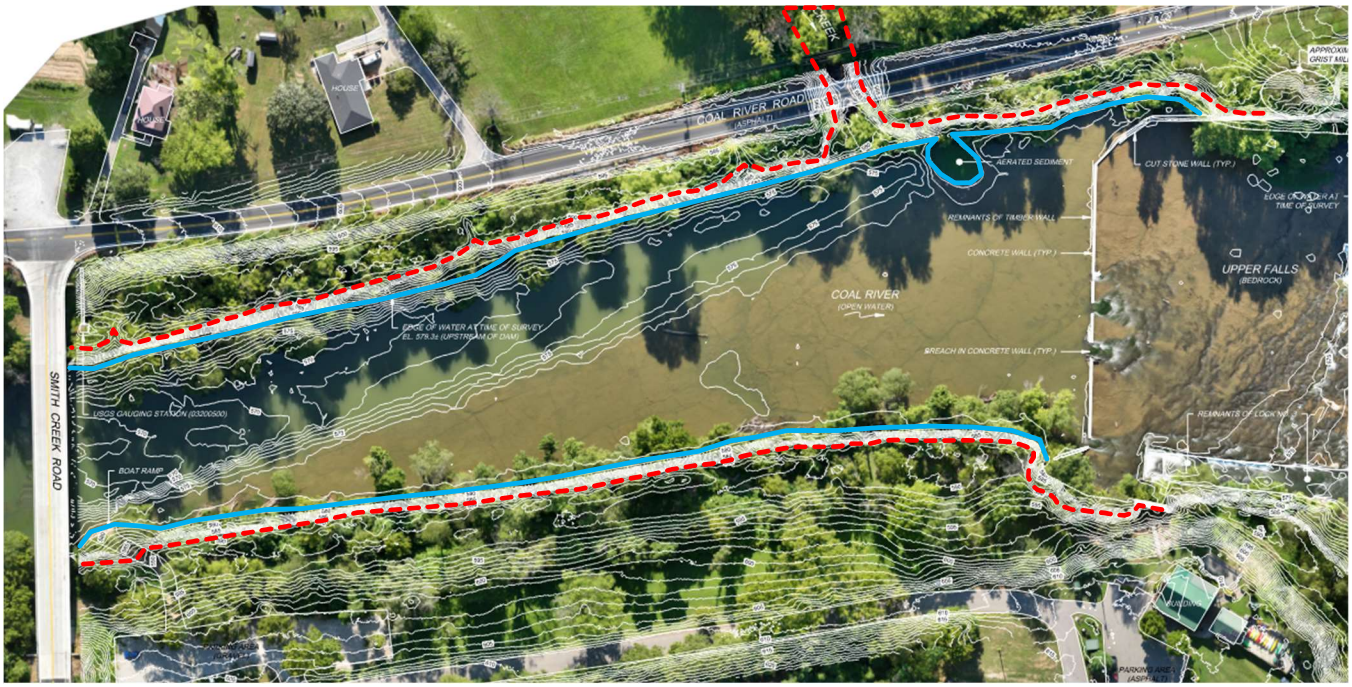



**Figure 25.** Aerial view of Coal River between the dam and Smith Creek Road bridge showing reservoir pool at time of GFT survey (El. 579.3± shown as solid blue line) compared to the pool which was reportedly formed by the 1850s navigational dam (El. 588± shown as dashed red line).

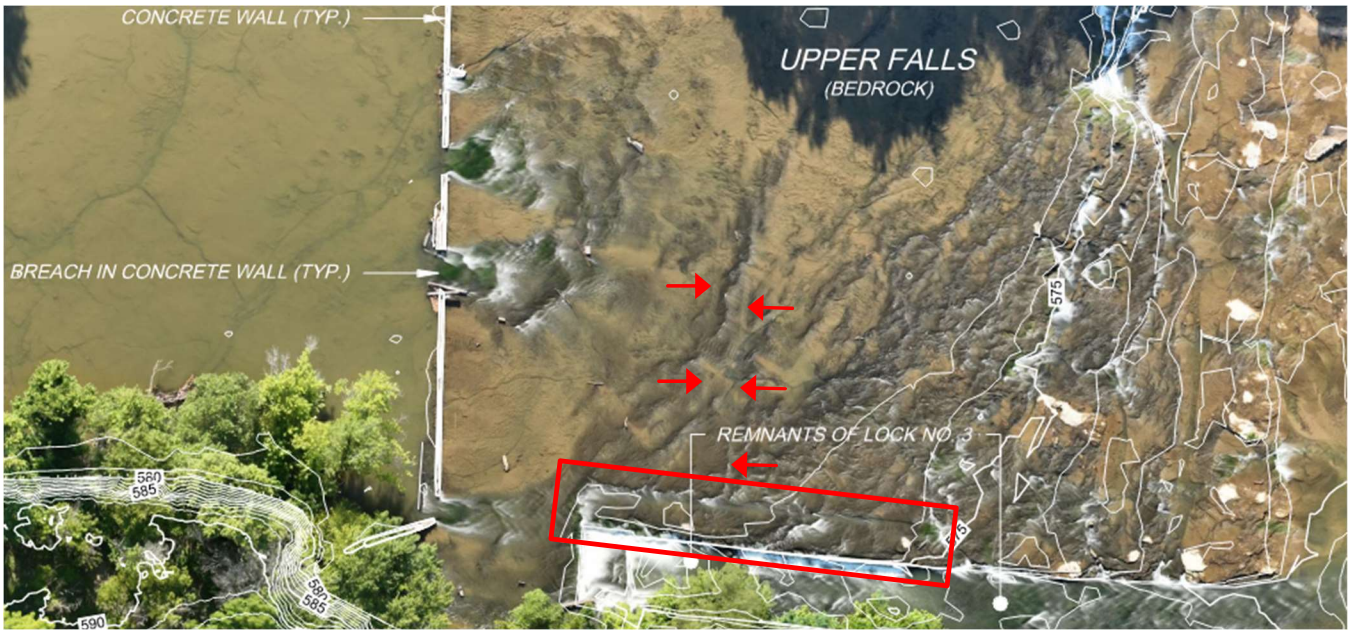



**Figure 26.** Aerial view showing remnants of keyways hewn into bedrock that received the base logs for the timber crib dam. Keyways for the timber crib structure that formed the left side of Lock No. 3 are circled in red. Two parallel keyways that may represent the original 1850s dam location are denoted with red arrows.

## 5.0 SEDIMENT DEPTH SURVEY

GFT conducted a sediment depth survey concurrently with the topographic and bathymetric surveys performed between August 19, 2025, and August 22, 2025. Upstream of the dam, the sediment depth survey was performed using a Jon boat and downstream of the dam the survey was performed by wading the river. Sediment depths were obtained by pushing a rod into the sediment, where present, to estimate the bottom of sediment. The bottom of sediment elevation was compared to the bottom of river (i.e., top of sediment) elevation obtained during the bathymetric survey to develop a sediment location and sediment depth map (refer to Sheets C6 and C7 in **Appendix A** for the Sediment Depth Plan).

Upstream of the dam, a small mound of aeriated sediment was observed along the left riverbank at the location where Falls Creek enters the Coal River. Based on its location, this sedimentation is likely deposition from Falls Creek. Sediment deposits up to 3.5 feet in depth were measured in the area of deeper water along the left riverbank. These deposits are located below the crest elevation of the rock ledge that forms the Upper Falls and would not be exposed if the dam was removed. No measurable sediment deposits were observed on the Upper Falls or on the rock ledge upstream of the dam along the right side of the river.

Downstream of the rock ledge that forms the Upper Falls, sediment deposits, mainly consisting of sands and gravels, were observed throughout the riverbed. The most significant sediment deposits are located immediately downstream of the Upper Falls, forming an aerated gravel bar which has been a long-standing feature of the river and is used by the public for recreational activities such as sunbathing. Downstream of the gravel bar, sediment deposits up to five feet in depth were observed which appear to extend downstream of the study area.

Sediment movement throughout a river system is a naturally occurring phenomenon that is typically more prevalent during larger (i.e., less frequent) storm events due to higher velocities that can pick up and move larger soil/gravel particles. The hydraulic analysis of the Coal River found within Section 10.0, indicates the presence of a downstream tailwater under these larger storm events that submerge the Upper Falls and the concrete dam. The tailwater, which is likely formed by downstream restrictions (such as bends in the river and narrowing of the river width), creates deeper and slower moving water that allows heavier particles (such as sand and gravel) to drop out of the water column. Consequently, the observed sediment deposits downstream of the dam are likely attributed to river conditions downstream of the Upper Falls and are not a result of the concrete dam. Review of aerial imagery in Google Earth dating back to 1996 shows little change in the river conditions downstream of the Upper Falls. The shape of the aerated gravel bar immediately downstream of the Upper Falls changes over time but generally remains in its current location and the downstream river reach appears to be relatively unchanged during this period, with no evidence of aeriated sediment that could reduce the conveyance capacity of the river. Based on the river hydraulics, localized dredging of the river immediately downstream of the Upper Falls would likely have a limited and short-lived value, as sediment deposition will likely continue, filling in any dredged areas.

## 6.0 SEDIMENT SAMPLING PLAN

On August 26, 2025, sediment sampling was performed upstream and downstream of the concrete dam to support the Plan-EA. Sediment samples were analyzed against a range of parameters to determine if chemical constituents are present in concentrations that would limit the use of the sediment and/or require special handling and/or disposal operations. Management of contaminated soil can be expensive, and if required, these costs should be taken into consideration when selecting the preferred alternative. Of particular concern would be if the project could result in an uncontrolled release of sediment accumulations from behind the dam. Ten (10) composite sediment samples were taken (7 upstream of the dam and 3 downstream of the dam) which were tested against a broad-spectrum of analytical parameters, including heavy metals, semi-volatile organic compounds (SVOCs), Polyaromatic Chlorinated Biphenyls (PCBs), chlorinated pesticides, herbicides, and others. The results were compared against West Virginia screening levels for sediment and residential soils. Testing also included grain size analysis to aid in determining the mobility of the material.

Grain size analysis found the sediment to consist primarily of sands and gravels. The sediment sampling results found arsenic to be a chemical constituent of concern. Arsenic concentrations in the sediment samples were below the West Virginia screening levels for sediment but were above the screening levels for residential soil. These results could impact disposal options for excavated sediment, if required as part of the preferred alternative. For example, use of excavated sediment in the river environment would be an accepted disposal option whereas use of the sediment in a residential setting, may not be permitted. Refer to the Sediment Characterization Report, bound separately, for additional information on the sediment sampling plan and associated results.

## 7.0 WETLANDS AND WATERWAYS INVESTIGATIONS AND STREAM ASSESSMENT

In August 2025, GFT performed wetland and waterways delineation, including a stream assessment, to establish the basis for project impacts and to support future permitting and mitigation planning, as appropriate. Identification of environmentally sensitive areas in the planning stages of the project, allows alternatives to be developed which minimize or eliminate impacts to these resources. The stream assessment, which samples macroinvertebrates from the riverbed, provides insight into the health of the river. This information can be used in future permitting activities to satisfy regulatory requirements of the USACE under the purview of Section 404 of the Clean Water Act, and the West Virginia Department of Environmental Protection (WVDEP) for Section 401 Water Quality Certification.

The wetlands and waterway investigations identified two perennial streams within the project study area, including the Coal River, and Falls Creek, which discharges into the Coal River approximately 200 feet upstream of the concrete dam. Most of the riverbanks throughout the study area slope steeply into the river and do not support the development of wetlands. One (1) palustrine emergent/palustrine forested (PEM/PFO) wetland (Wetland 1), totaling 0.368 acres (0.230 acres PEM and 0.138 acres PFO), was identified downstream of the dam along the right riverbank in an area of accumulated sediment (refer to **Figure 27**). Located in a popular spot for accessing the river, the wetland area is highly disturbed by human activity and is subject to routine inundation by river flows.

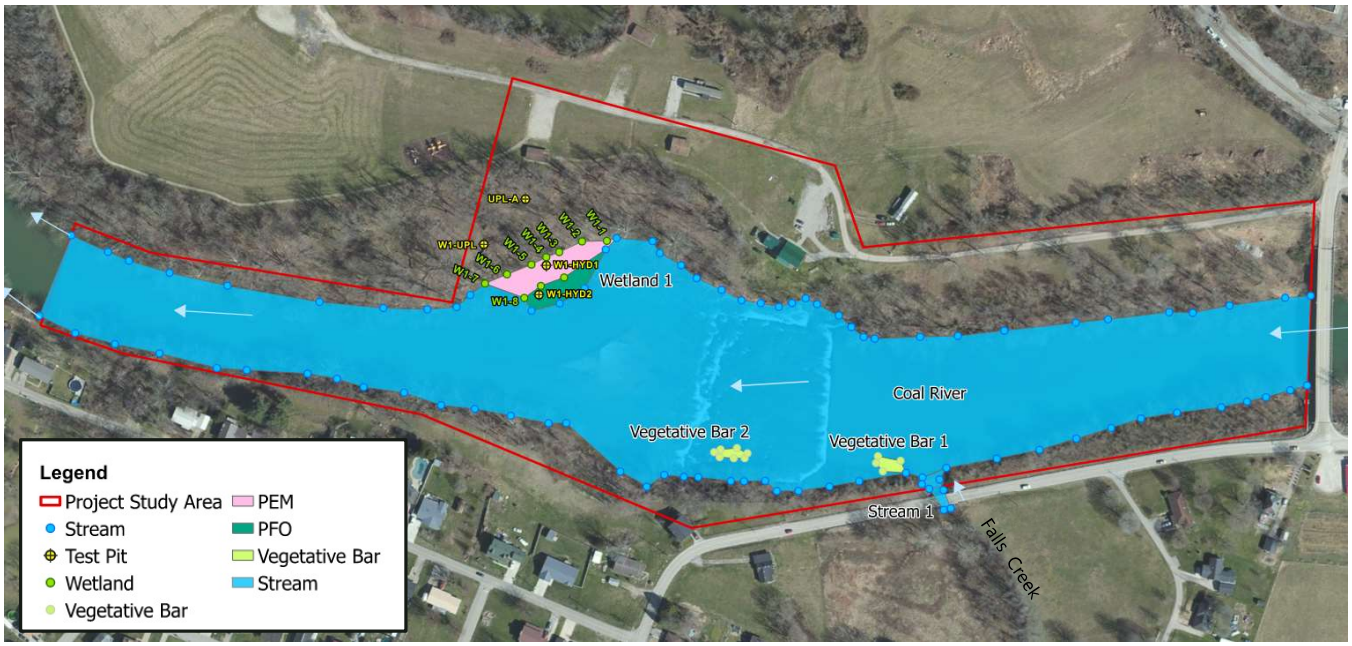



**Figure 27.** Plan view showing identified wetlands (Wetland 1) and waterways (Coal River and Falls Creek) within the project study area.

Macroinvertebrates were sampled from four locations throughout the study area in accordance with *Rapid Bioassessment Protocols (RBP) for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish (2nd Edition)*. Sampling locations included, (1) Falls Creek, (2) Coal River upstream of the dam within the reservoir, (3) Coal River downstream of the rock outcrop that forms the Upper Falls, and (4) Coal River downstream of the dam on the Upper Falls. Stream condition scores were assigned using the RBP criteria and the West Virginia Stream Condition Index (WVSCI) multi-metric index methodology. A scope classification of "sub-optimal" was determined for all four sampling locations under the RBP habitat assessment. Under the WVSCI assessment, the

sampling locations located on and downstream of the Upper Falls received a score classification of "very good", the sampling location upstream of the dam received a score classification of "Moderately Impaired', and Falls Creek received a score classification between "Good" and "Slightly Impaired". The sampled reaches downstream of the dam scored better than the sampled reaches upstream of the dam, having a higher abundance of total microinvertebrates and sensitive species. It is possible that the impounding effect of the dam results in reduced suitability of the reservoir for microinvertebrate habitat. Refer to the Natural Resources Report, bound separately, for additional information on the wetland and waterway delineation and the stream assessment results.

# 8.0 VISUAL ASSESSMENT OF RIVERBANK CONDITIONS

## 8.1 General.

On August 26th and 27th, 2025, GFT performed a visual assessment of the riverbanks located upstream and downstream of the concrete dam at Tornado. At the time of the field reconnaissance, the Coal River was in a period of low flow. The USGS Stream Gauge 0320500 on the Coal River at Tornado was reading approximately 9.3 feet with a corresponding river flow of approximately 170 cfs. The upstream river reach, extending approximately two miles upstream of the Smith Creek Road bridge, was observed on August 26, 2025, utilizing kayaks to observe the banks from the river elevation. The area downstream of the dam, extending to the downstream limits of the study area, was observed on August 27, 2025. Due to shallow water depths at the time of the field view, the area downstream of the dam was accessed by foot. Photographs documenting the field observations are provided in **Appendix B**.

In general, the observed riverbanks, both upstream and downstream of the dam slope steeply into the river, have a lack of understory plants, and contain a narrow band of scarp, which is a naturally occurring feature in river environments, at the low-flow water line. Overall, the riverbanks appear stable with no major or widespread areas of slope instability observed. Exceptions were noted where human activity has contributed to localized areas of vegetation loss, scour and bank erosion. Examples include access points to the river where foot traffic has denuded the vegetative ground cover and drainage culvert outfalls where storm flow has resulted in local scour and erosion.

Immediately downstream from the dam and the remnants of Lock No. 3, a pronounced scour hole has developed, while further downstream, several large, sandy mid-channel bars have developed which are commonly used by the public for recreation. At the downstream end of the project area, the stream winds around a point bar, which was found to be stable and exhibiting good geomorphic form.

The prevalence of invasive species, including kudzu and bamboo, within the stream corridor was observed. Kudzu poses a threat by smothering canopy trees, while bamboo has weak root structures and can shade out more beneficial native species.

As discussed in Section 10.0, the dam removal option generally results in a reduction in upstream water elevations of less than one foot. Due to the steep riverbank slopes, this drop in upstream water elevation will expose a very narrow strip of the riverbank during low-flow conditions. During low-flow conditions, when this additional strip of riverbank is exposed, velocities in the river are very slow (less than one-half foot per second). Such velocities would not be expected to cause erosion or bank instability.

## 8.2 Options to Improve the Stability of the Riverbanks and Enhance the Riverine Environment

The riverbanks upstream and downstream of the dam could benefit from additional deep rooted understory plants, such as live stakes, to reduce the potential for future bank erosion. Consideration should also be given to limiting or consolidating the number of access points to the river, thus concentrating foot traffic and reducing the overall potential for vegetation loss and bank erosion. Maintaining access to the Upper Falls and the gravel bars located downstream of the falls should be a priority to maintain recreational use of these areas. Established access points should be stabilized accordingly to provide safe passage to the river while minimizing streambank degradation.

Management of invasive species would benefit the Coal River corridor. In particular, removal of kudzu would prevent this invasive plant from smothering canopy trees and removal of bamboo would allow native understory plants to establish which have stronger root systems capable withstanding river flows and reducing the potential for riverbank erosion.

To address the existing riverbank conditions, the District could consider implementing a watershed community based public education program to inform the public, and specifically property owners along the river, of measures they can implement to enhance the riverine environment.

## 9.0 THREATENED AND ENDANGERED SPECIES

NRCS has initiated threatened and endangered species coordination with the U.S. Fish and Wildlife Service and the West Virginia Division of Natural Resources (refer to **Appendix C**). The initial screening, which extends two miles upstream and two miles downstream of the Upper Falls, identified numerous threatened and endangered species that may be within the study area. These included:

- Bats: Gray bat, Indiana bat, Northern Long-eared bat, and Tricolored bat.
- Clams: Pink Mucket, Round Hickorynut, and Sheepnose Mussel.
- Insects: Monarch Butterfly.
- Birds of Conservation Concern: Black-capped Chickadee, Cerulean Warbler, Chimney Swift, Red-headed Woodpecker, Rusty Blackbird and Wood Thrush.

Protection of threatened and endangered species can be achieved in several ways, including avoiding the habitat that supports the species, physically relocating the species, and/or implementing time of year work restrictions to avoid disturbing the species during critical periods, such as nesting periods for birds or migratory periods for fish. Consultation with the NRCS State Biologist has identified the following conservation measures which should be considered to reduce and/or avoid impacts to threatened and endangered species:

- To the greatest extent possible, avoid adverse impacts to trees, shrubs, or other native vegetation.
- Conduct tree removal between the dates of November 15 through March 31.
- Avoid removing trees ≥3" diameter at breast heigh (DBH) with exfoliating bark, dead and dying trees, broken treetops, splintering or split areas, and trees with cavities or hollowed areas.
- All construction equipment should be fueled and maintained in upland areas, beyond the bed and banks of the Coal River.
- Install and maintain appropriate measures to minimize sediment and turbidity throughout the duration of the project.
- During construction, implement measures to ensure that the transport of excess nutrients, sediments, pesticides, or toxic substances to streams and waterbodies does not occur.
- Limit the use of herbicides/pesticides to minimize chemical drift and overspray, which includes using hooded sprayers, low pressure nozzles, hand-application, or spot applications such as cut-stump or hack and squirt methods that avoid incidental adverse impacts to non-target species, if herbicides/pesticides must be used at all.

Prior to implementation of the preferred alternative, (1) narrow the proposed action area, which includes all areas affected, directly or indirectly, by the proposed action, (2) conduct additional agency coordination, if needed, to determine if species of concern are known to exist within the anticipated work area, and (3) identify any additional conservation measures which may be needed to reduce / avoid impacts to known species of concern within the work area.

## 10.0 HYDRAULIC ANALYSIS

A hydraulic analysis was performed to evaluate the impact the concrete dam at Tornado has on the Coal River (i.e., "with dam" and "without dam" scenarios). The original hydraulic river model, which extends approximately six miles upstream and downstream from the dam, was secured from FEMA and imported into HEC-RAS 6.6 to perform the hydraulic analysis. The model was then updated to incorporate current terrain data to establish a model that best represents the existing site conditions. Terrain data used to update the model included the topographic/bathymetric survey performed by GFT within the study area (refer to Section 4.0 for a description of the survey performed in August 2025) and eight river cross sections located upstream of the Smith Creek Road bridge. The eight upstream cross sections, which are in the same general location as the original cross sections used in the FEMA model, were surveyed by GFT using a Jon boat and single beam sonar. The most upstream surveyed cross section was located more than two miles upstream of the Smith Creek Road bridge.

The hydraulic analysis evaluated a wide range of river flow conditions, including flood discharges of 38,500 cfs, 56,500 cfs, 66,500 cfs and 88,000 cfs which correspond to the 10-, 50-, 100- and 500-year storm events, respectively, and non-flood discharges ranging from 150 cfs to 2,000 cfs. During the larger storm events (i.e., the 10- through the 500-year events), the hydraulic model shows no change in water elevation (upstream or downstream) between the "with dam" and "without dam" scenarios. This is due to the downstream tailwater which submerges the dam during high flow events (i.e., the upstream river elevations are controlled by the river conditions downstream of the Upper Falls, and not by the concrete dam). Photographs showing the tailwater condition under various flow conditions are shown in **Figure 28.** Note that with increasing flow, the tailwater continues to rise, eventually submerging the dam.



**Figure 28.** Photographs showing the tailwater below the dam under various river flow conditions. Note how the downstream tailwater eventually submerges the dam, controlling the water elevations through this reach of the Coal River. River flow is approximately 480 cfs in top left photo, approximately 6,050 cfs in top right photo, and approximately 10,400 cfs in bottom photo.

The impact of removing the dam was also evaluated under a range of non-flooding flow rates ranging from 150 cfs to 2,000 cfs, including a flow rate of 700 cfs which corresponds to the average daily flow rate recorded by the USGS Stream Gauge No. 03200500 located on the Coal River immediately downstream of the Smith Creek Road bridge. Under these non-flooding flow rates, the hydraulic model shows the removal of the dam will result in reduced upstream water elevations. For the 700 cfs flow rate, the drop in water elevation is approximately one foot at the Smith Creek Road bridge, with the magnitude of the drop diminishing in an upstream direction. At the upstream end of the hydraulic model (approximately six miles upstream), the change in water elevation is less than a tenth of a foot.

To assist the reviewer in visualizing this change in water elevation, 14 cross sections were cut upstream of the dam, with the most upstream cross section located more than two miles upstream of the Smith Creek Road bridge (refer to **Appendix D** for cross sections). The river bottom depicted on each cross section is based on bathymetric survey performed by GFT in August 2025. On each cross section, the 700 cfs water elevation is shown as a solid red line for the "with dam" scenario and as a dashed-dotted red line for the "without dam" scenario and the remaining pool is shaded in blue. The cross sections also show the results of the hydraulic analysis for a 200 cfs flow rate (a flow rate similar to that which was occurring during the time of the GFT field surveys in August 2025), using a solid blue line for the "with dam" scenario and a dashed-dotted blue line for the "without dam" scenario. On each cross section, the remaining water depth (at its deepest location) associated with the "without dam" scenario is called out for both the 700 cfs flow rate and the 200 cfs flow rate. Excluding the cross section located approximately 55 feet upstream of the dam, which is cut through the rock ledge that forms the Upper Falls, the water depths that will remain under the "without dam" scenario in the upstream 13 cross sections averages 7.0 feet and ranges from 3.4 feet at the cross section located 2.3 miles upstream of the Smith Creek Road Bridge to 14.6' at the cross section located 1.9 miles upstream of the Smith Creek Road bridge.

Unlike flood control dams, which have large storage areas that are intended to fill with each storm event and then slowly drain, releasing water at a slow rate to provide downstream flood protection, the concrete dam at the town of Tornado is a run-of-the-river dam that does not contain flood storage (i.e., water entering the reservoir immediately leaves the dam without being detained). Since the dam does not provide flood control, the downstream river reaches would not experience a measurable change in river flow conditions regardless of whether the dam is retained or removed.

Refer to the Hydraulic Analysis Report, bound separately, for more detailed information associated with hydraulic analysis performed as part of the Plan-EA.

## 11.0 CULTURAL RESOURCE INVESTIGATIONS

Cultural resource investigations were performed by Markosky, a specialty subconsultant to GFT. Initial investigations included a Phase IA archaeological report to assess the archaeological potential (historic and precontact) of the study area and to determine the appropriate methods of archaeological excavation, if required. This effort consisted of background research, including consultation with the West Virginia State Historic Preservation Office interactive map files, archaeology report abstracts, academic and peer-reviewed publications, National Register of Historic Places (NRHP) files, and historic resource survey files, as applicable. The Phase IA research report determined that the study area has precontact and historic archaeological potential. Numerous precontact archaeological sites are recorded in close proximity to the study area and one historic archaeological site with at least three documented features is present within the study area. Additionally, the west bank of the river was identified as an area likely to contain archaeological remains of a late nineteenth century gristmill. Refer to the Phase IA Archaeological Research Report, bound separately, for more information on the initial cultural resource investigations.

Initial investigations also include a desktop review and field view of above ground historic resources within a one-mile radius of the project study area. The desktop review identified 35 resources within the one-mile radius, of which two (KA-4675 which is the concrete dam and KA-4676 which is the remnants of Lock No. 3) were listed as contributing resources to the NRHP-listed Coal River Locks, Dams, and Log Boom Archaeological District. Based on the findings of this study, the concrete dam and the remnants of the timber wall immediately upstream of the concrete dam are believed to be associated with the historic gristmill on the west bank of the river and constructed after the navigational dams of the Coal River were removed from service. As such, it is recommended that KA-4675 does not contribute to the archaeological district's NRHP-qualifying significance due to the structure's lack of association to the navigation and log boom period. The above ground investigations are summarized in two documents, bound separately, entitled (1) Above Ground Historic Resources Desktop Survey, and (2) Architectural and Historical Resources Identification Survey Report.

As recommended by the Phase IA report, archaeology investigations (i.e., test pits) were conducted in the area around the gristmill ruins on the west bank of the Coal River and in upland areas within Meadowood Park on the east side of the river. In total, 592 artifacts were documented, of which almost half were glass pieces. Also, 19 pre-contact artifacts were found on the east side of the river, including two bifaces. These findings confirm that the area around the gristmill ruins on the west riverbank and the upland areas around the Coal River Group building and associated parking lots on the right riverbank, are archaeologically-sensitive areas. Should the preferred alternative require disturbance of one or both of these sensitive areas, additional field investigations may be warranted.

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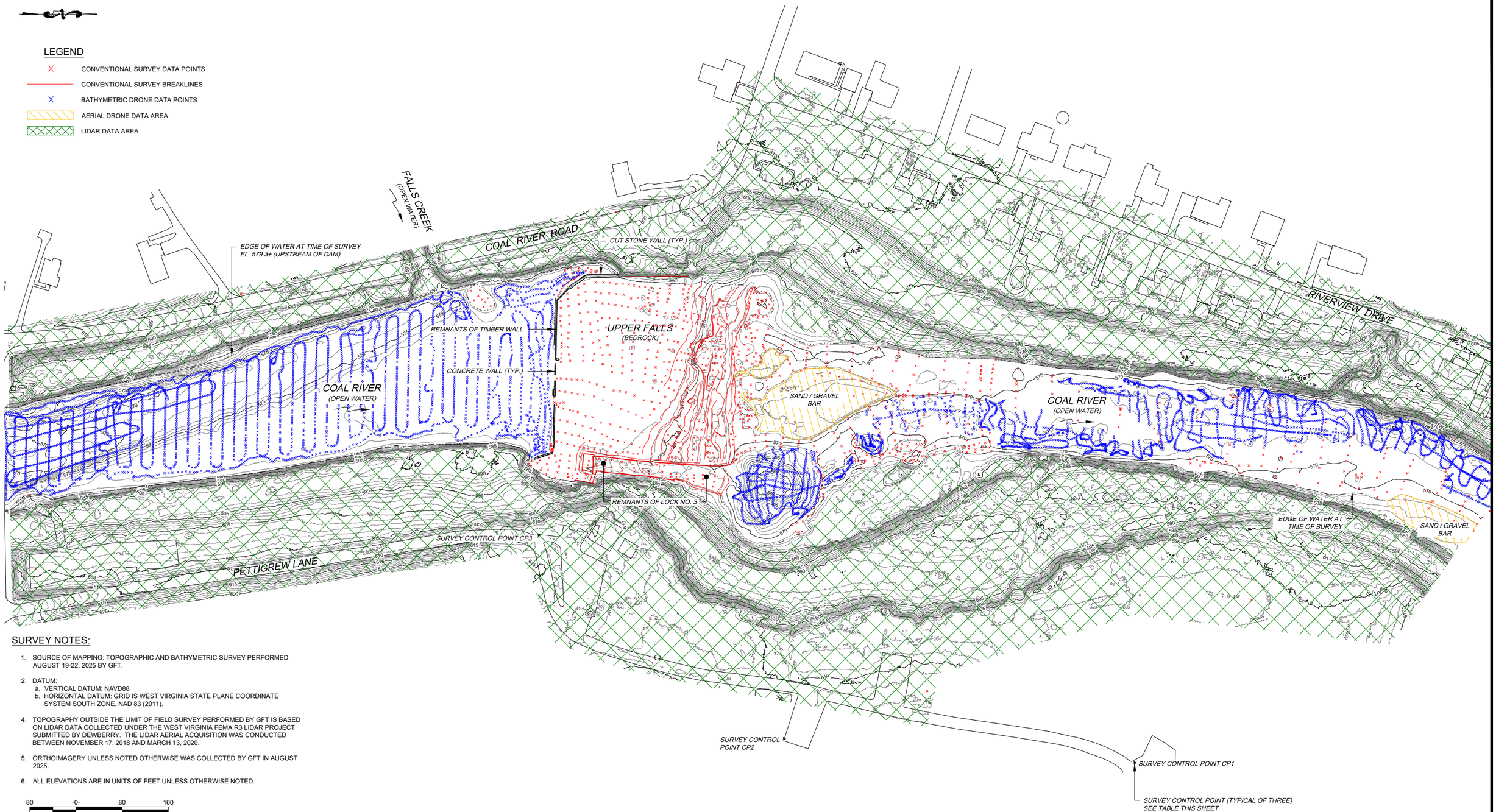
1988 Tornado Remembers. Kanawha County Bicentennial. St. Albans Historical Society.

# APPENDIX A

## DRAWINGS

LEGEND

- CONVENTIONAL SURVEY DATA POINTS
- CONVENTIONAL SURVEY BREAKLINES
- BATHYMETRIC DRONE DATA POINTS
- AERIAL DRONE DATA AREA
- LIDAR DATA AREA




## SURVEY NOTES:

1. SOURCE OF MAPPING: TOPOGRAPHIC AND BATHYMETRIC SURVEY PERFORMED AUGUST 19-22, 2025 BY GFT.
2. DATUM:
   a. VERTICAL DATUM: NAVD88
   b. HORIZONTAL DATUM: GRID IS WEST VIRGINIA STATE PLANE COORDINATE SYSTEM SOUTH ZONE, NAD 83 (2011).
4. TOPOGRAPHY OUTSIDE THE LIMIT OF FIELD SURVEY PERFORMED BY GFT IS BASED ON LIDAR DATA COLLECTED UNDER THE WEST VIRGINIA FEMA R3 LIDAR PROJECT SUBMITTED BY DEWBERRY. THE LIDAR AERIAL ACQUISITION WAS CONDUCTED BETWEEN NOVEMBER 17, 2018 AND MARCH 13, 2020.
5. ORTHOIMAGERY UNLESS NOTED OTHERWISE WAS COLLECTED BY GFT IN AUGUST 2025.
6. ALL ELEVATIONS ARE IN UNITS OF FEET UNLESS OTHERWISE NOTED.

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SCALE IN FEET

HORIZONTAL AND VERTICAL SURVEY CONTROL POINTS

| ID | NORTH (FT.) | EAST (FT.) | ELEVATION (FT) | DESCRIPTION |
|---|---|---|---|---|
| CP1 | 490,685.85 | 1,727,800.18 | 611.01 | MAG NAIL IN MACADAM |
| CP2 | 490,078.08 | 1,727,759.95 | 611.47 | MAG NAIL IN MACADAM |
| CP3 | 489,652.54 | 1,727,407.86 | 613.75 | MAG NAIL IN MACADAM |

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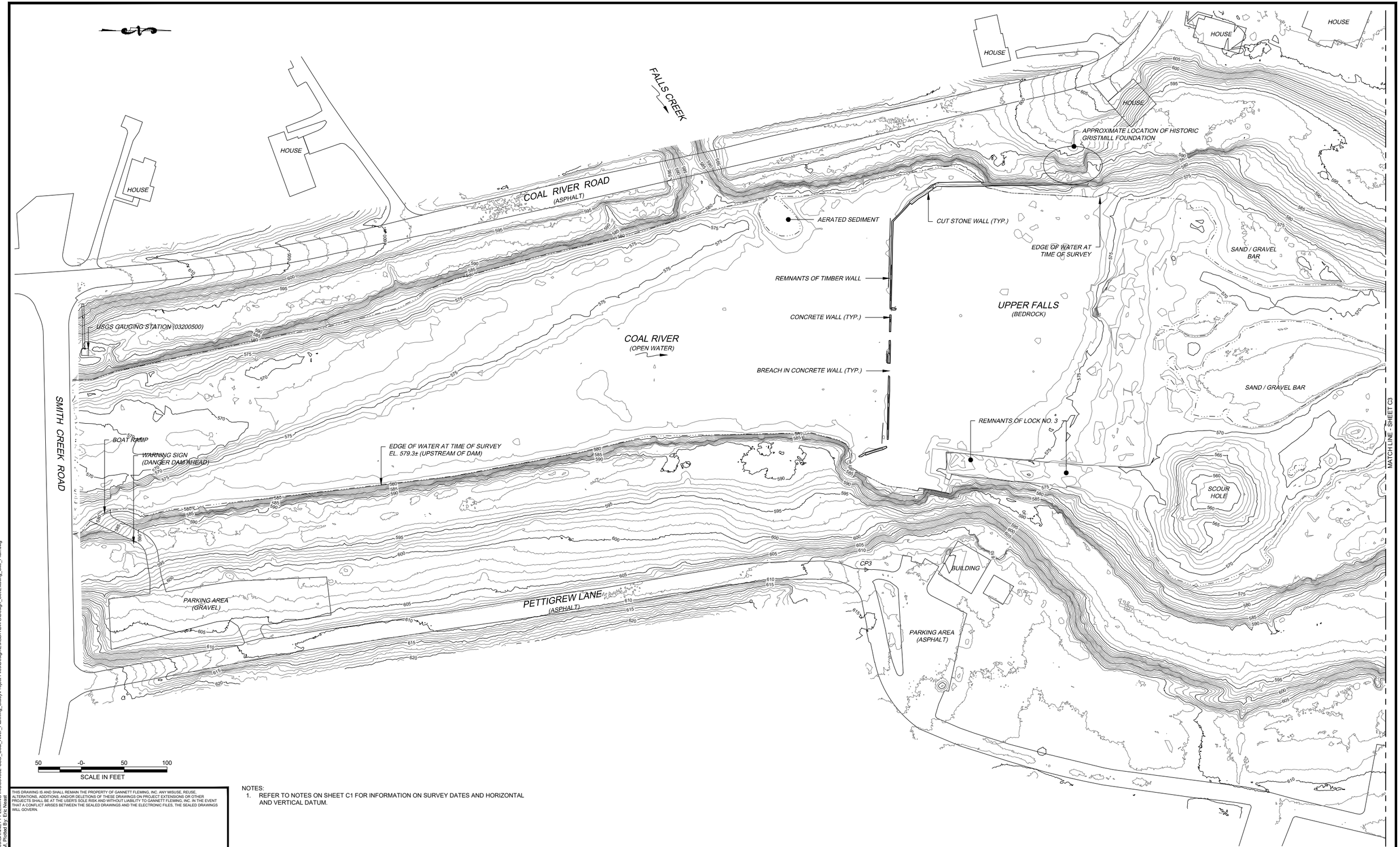
CAPITOL CONSERVATION DISTRICT
CROSS LANES, WV

WATERSHED PLAN-EA FOR THE COAL RIVER WATERSHED

EXISTING CONDITIONS
SITE PLAN
SHOWING SURVEY DATA SOURCES

| JOB NO. | SHEET NO. |
|---|---|
| 084562 | C1 |
| DATE | DRAWING NO. |
| JAN. 2026 | 1 OF 8 |

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SCALE IN FEET

NOTES:
1. REFER TO NOTES ON SHEET C1 FOR INFORMATION ON SURVEY DATES AND HORIZONTAL AND VERTICAL DATUM.

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GANNETT FLEMING

CAPITOL CONSERVATION DISTRICT
CROSS LANES, WV

WATERSHED PLAN-EA FOR THE
COAL RIVER WATERSHED

EXISTING CONDITIONS
SITE PLAN
SHEET 1 OF 2

| JOB NO. | SHEET NO. |
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| 084562 | C2 |
| DATE | DRAWING NO. |
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Plot Date: 1/12/2026 2:58 PM, Plotted By: Eric Nowak




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GANNETT FLEMING

CAPITOL CONSERVATION DISTRICT
CROSS LANES, WV

WATERSHED PLAN-EA FOR THE
COAL RIVER WATERSHED

EXISTING CONDITIONS
SITE PLAN
SHEET 2 OF 2

| JOB NO. | SHEET NO. |
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NOTES:
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GANNETT FLEMING

CAPITOL CONSERVATION DISTRICT
CROSS LANES, WV

WATERSHED PLAN-EA FOR THE
COAL RIVER WATERSHED

EXISTING CONDITIONS
SITE PLAN WITH AERIAL IMAGE
SHEET 1 OF 2

| JOB NO. | SHEET NO. |
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NOTES:
1. REFER TO NOTES ON SHEET C1 FOR INFORMATION ON SURVEY DATES AND HORIZONTAL AND VERTICAL DATUM.

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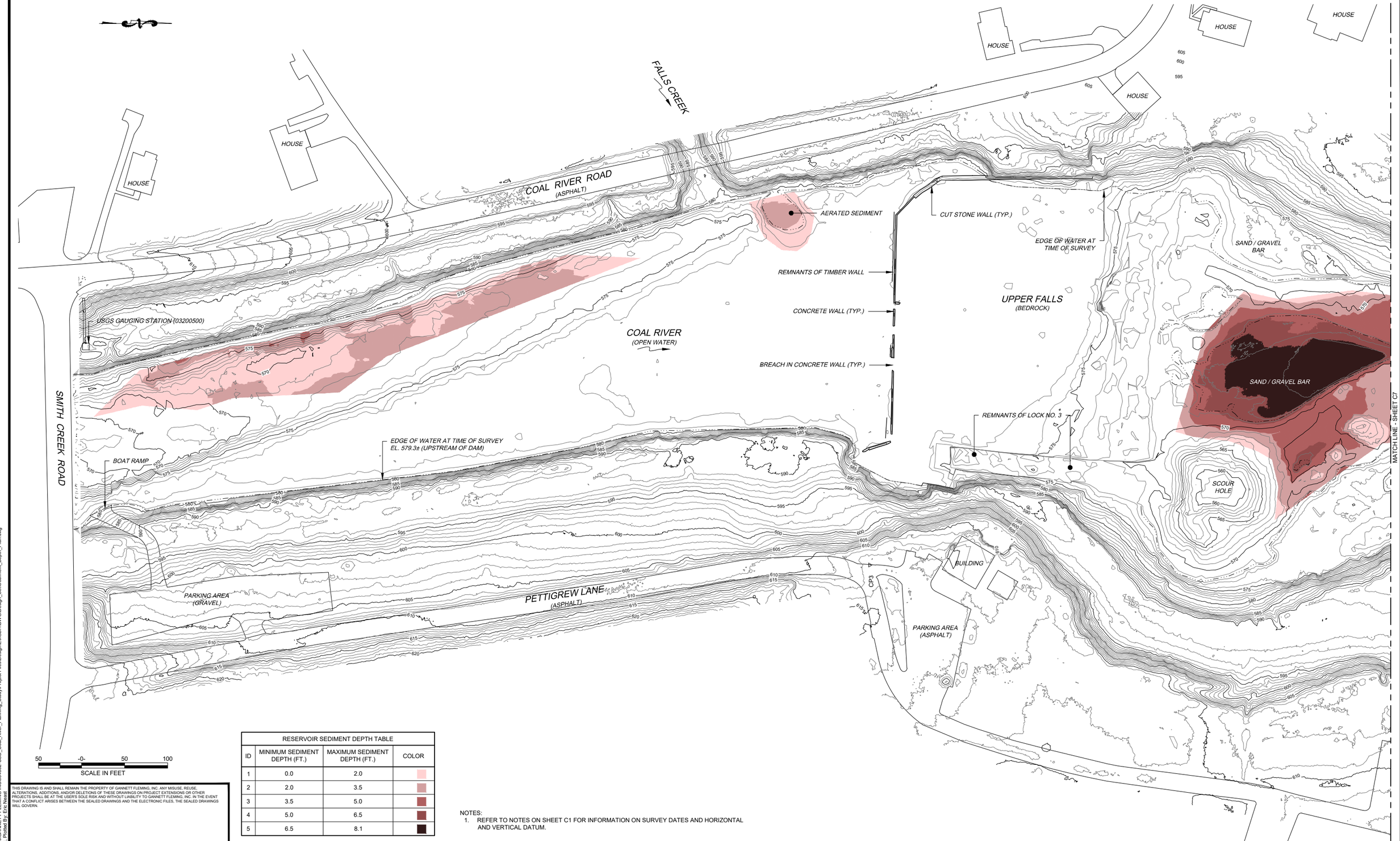
CAPITOL CONSERVATION DISTRICT
CROSS LANES, WV

WATERSHED PLAN-EA FOR THE
COAL RIVER WATERSHED

EXISTING CONDITIONS
SITE PLAN WITH AERIAL IMAGE
SHEET 2 OF 2

| JOB NO. | SHEET NO. |
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| RESERVOIR SEDIMENT DEPTH TABLE | | | |
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| ID | MINIMUM SEDIMENT DEPTH (FT.) | MAXIMUM SEDIMENT DEPTH (FT.) | COLOR |
| 1 | 0.0 | 2.0 | |
| 2 | 2.0 | 3.5 | |
| 3 | 3.5 | 5.0 | |
| 4 | 5.0 | 6.5 | |
| 5 | 6.5 | 8.1 | |

NOTES:
1. REFER TO NOTES ON SHEET C1 FOR INFORMATION ON SURVEY DATES AND HORIZONTAL AND VERTICAL DATUM.

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GANNETT FLEMING

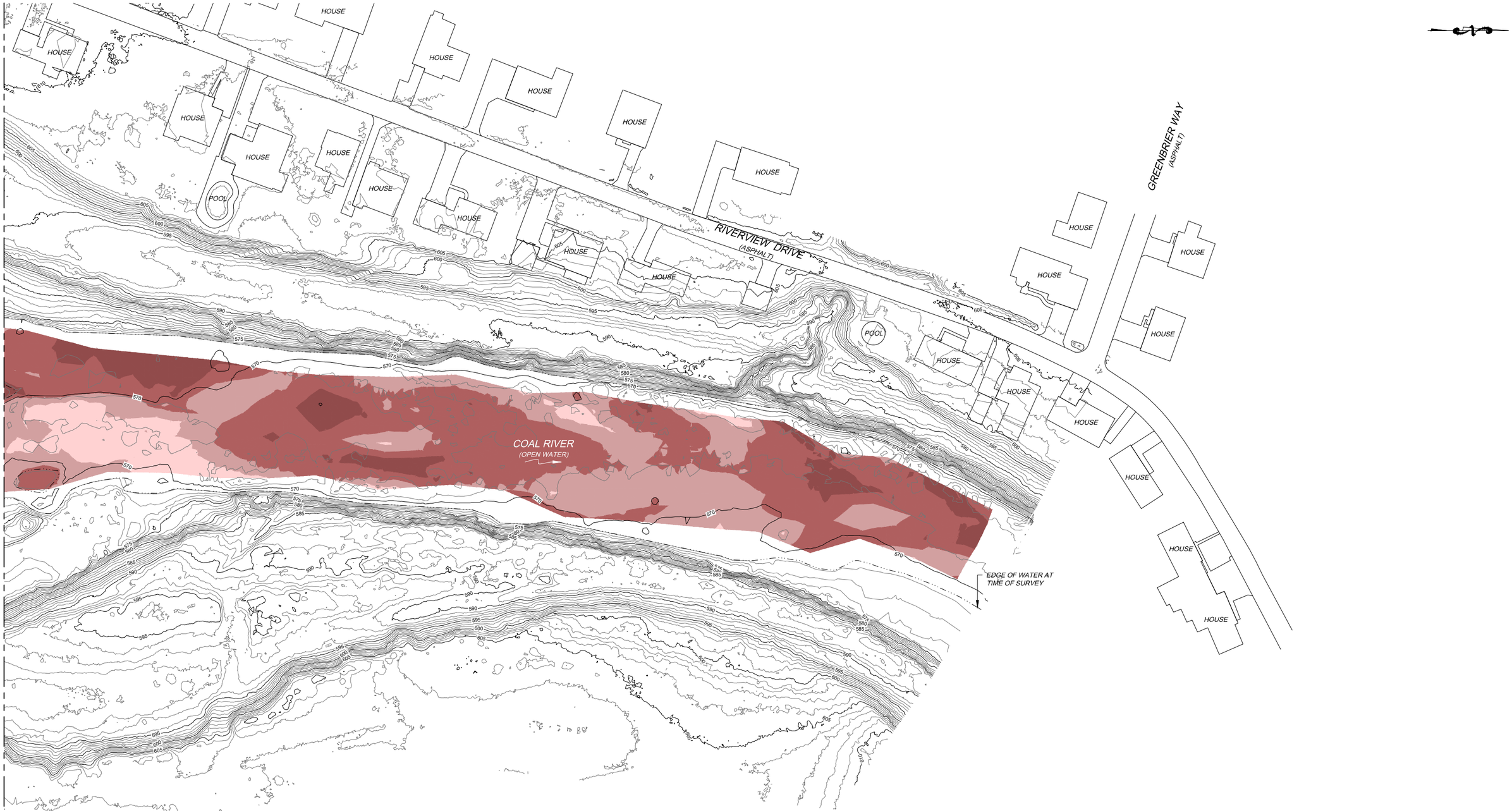
CAPITOL CONSERVATION DISTRICT
CROSS LANES, WV

WATERSHED PLAN-EA FOR THE
COAL RIVER WATERSHED

EXISTING CONDITIONS
SEDIMENT DEPTH PLAN
SHEET 1 OF 2

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| RESERVOIR SEDIMENT DEPTH TABLE | | | |
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| 2 | 2.0 | 3.5 | |
| 3 | 3.5 | 5.0 | |
| 4 | 5.0 | 6.5 | |
| 5 | 6.5 | 8.1 | |

NOTES:
1. REFER TO NOTES ON SHEET C1 FOR INFORMATION ON SURVEY DATES AND HORIZONTAL AND VERTICAL DATUM.

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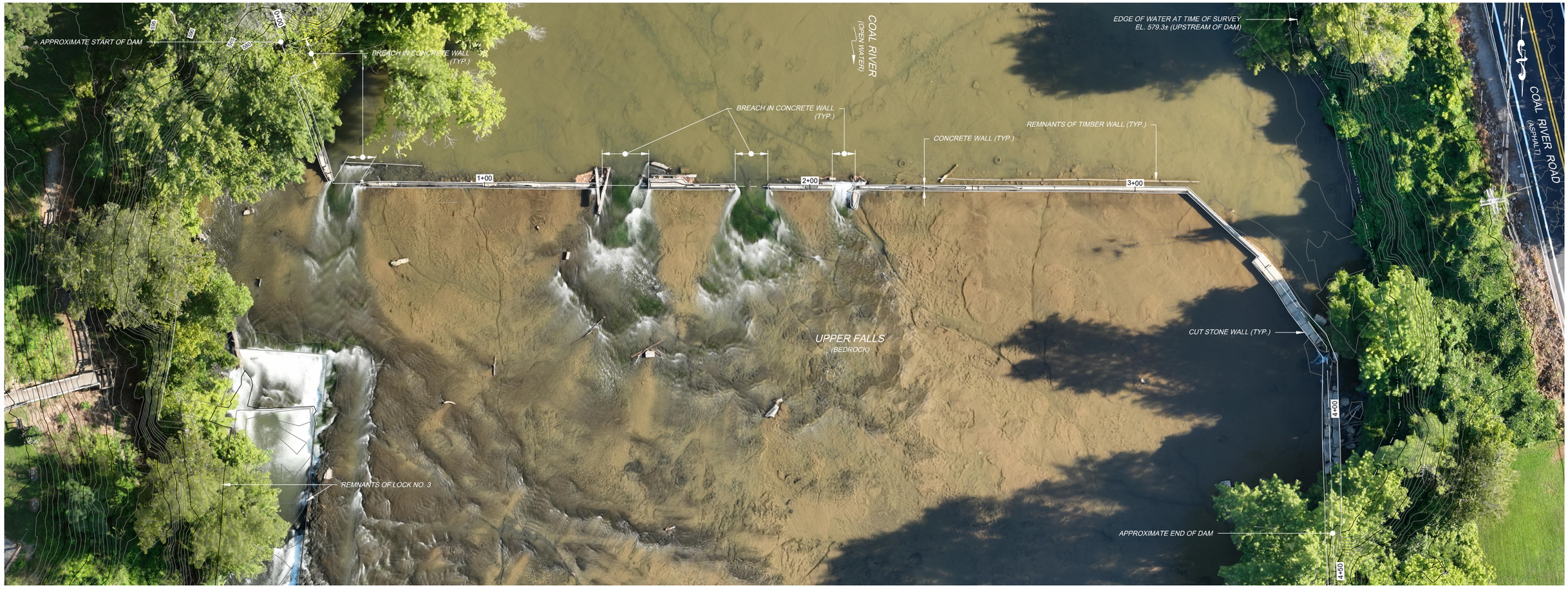
CAPITOL CONSERVATION DISTRICT
CROSS LANES, WV

WATERSHED PLAN-EA FOR THE
COAL RIVER WATERSHED

EXISTING CONDITIONS
SEDIMENT DEPTH PLAN
SHEET 2 OF 2

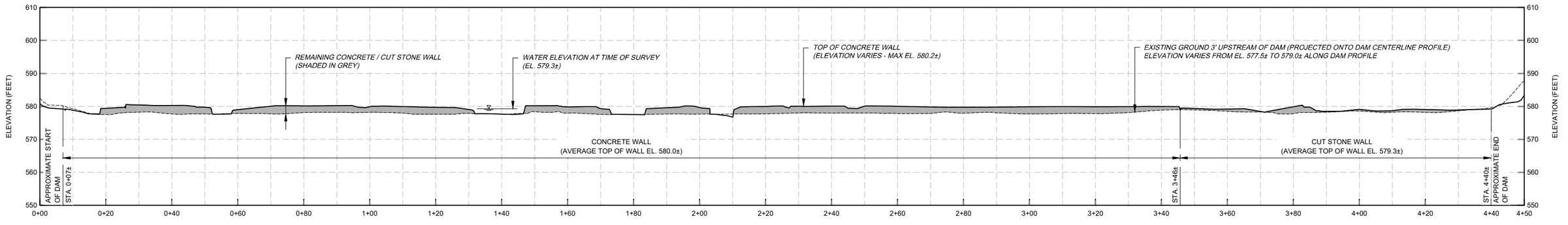
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## ENLARGED PLAN OF EXISTING DAM

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## EXISTING DAM PROFILE
## (LOOKING UPSTREAM)

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SCALE IN FEET

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GANNETT FLEMING

CAPITOL CONSERVATION DISTRICT
CROSS LANES, WV

WATERSHED PLAN-EA FOR THE
COAL RIVER WATERSHED

EXISTING CONDITIONS
ENLARGED PLAN OF DAM AND
DAM PROFILE

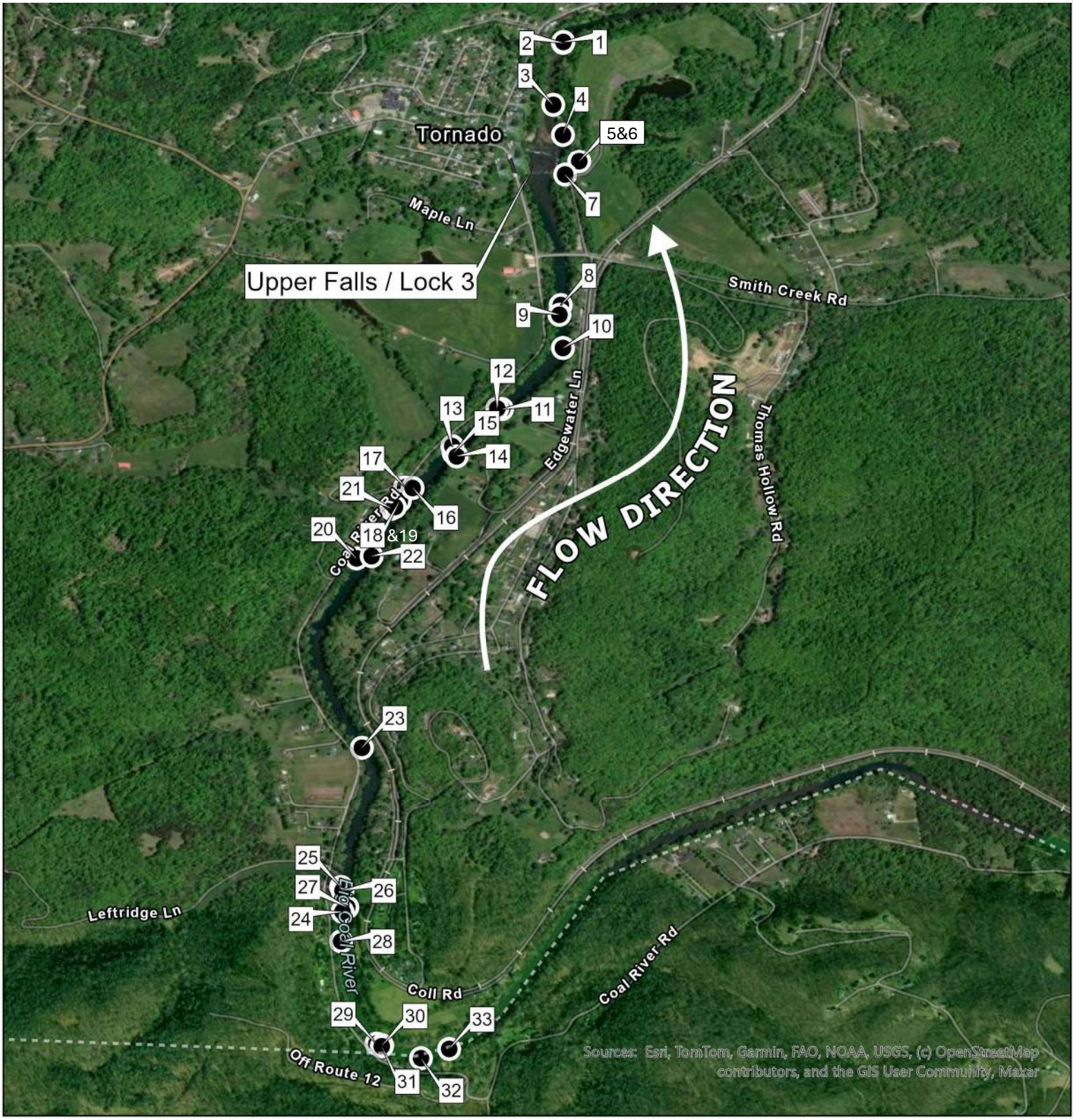
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# APPENDIX B

## RIVERBANK INVESTIGATION PHOTOGRAPHS

# Coal River Planning Study
# Visual Assessment of Riverbank Conditions
# Photo Location Map




N

0 0.25 0.5 Miles

● Site Visit Photo
(Taken on August 26th and 27th, 2025)

GFT



**Photo1.** View of point bar on inside meander bend of Coal River at downstream end of study area (looking downstream). The opposing bank appears stable and contains ample vegetation. In this area, there are also some large boulders increasing the stability of the bank. Reviewing the visible point bar indicated that typical bed load is 3- to 4.5-inch cobbles.



**Photo 2.** View of point bar on inside meander bend of Coal River at downstream end of study area (looking upstream). The opposing bank appears stable with ample vegetation and minimal evidence of erosion. The stream is slow here and a deep pool is evident on the opposite bank.



**Photo 3.** View of right shoreline (looking downstream). Note debris accumulations approximately five feet above the current water elevation, indicating recent elevated storm flows.



**Photo 4.** View of Upper Falls and concrete dam (standing downstream of Upper Falls looking upstream). Remnants of Lock No. 3 is visible along left side of photograph. Gravel bar is visible in right center of photograph which is used by the public for recreation.



**Photo 5.** View of concrete dam from a point near the Coal River Group building in Meadowood Park (looking west). The dam sits on a natural rock outcrop (i.e., the Upper Falls) that forms a natural "dam" across the Coal River. Note water elevation upstream and immediately downstream of the dam are nearly identical (refer to Photo 7), indicating the dam has a negligible influence on the upstream water levels under these flow conditions.



**Photo 6.** View of Upper Falls from the back deck of the Coal River Group building in Meadowood Park (looking west). The concrete dam is located just beyond the left edge of the photograph (refer to Figure 5). The falls are a result of a natural rock outcrop that spans the Coal River. The Upper Falls and downstream gravel bars (visible along the right side of the photograph) are used by the public for recreation.



**Photo 7.** View of concrete dam (looking west). Difference in water level between upstream and downstream sides of the dam was approximately one foot at time of site visit. Dam has completely failed in several locations, allowing river flow to pass through the damaged sections with no flow passing over the dam at time of site visit.



**Photo 8.** View of west bank of Coal River. Note steep slopes and lack of understory vegetation that results in bare areas. Scour and erosion observed at outfall of drainage pipe (just to left of large tree at right side of photograph).

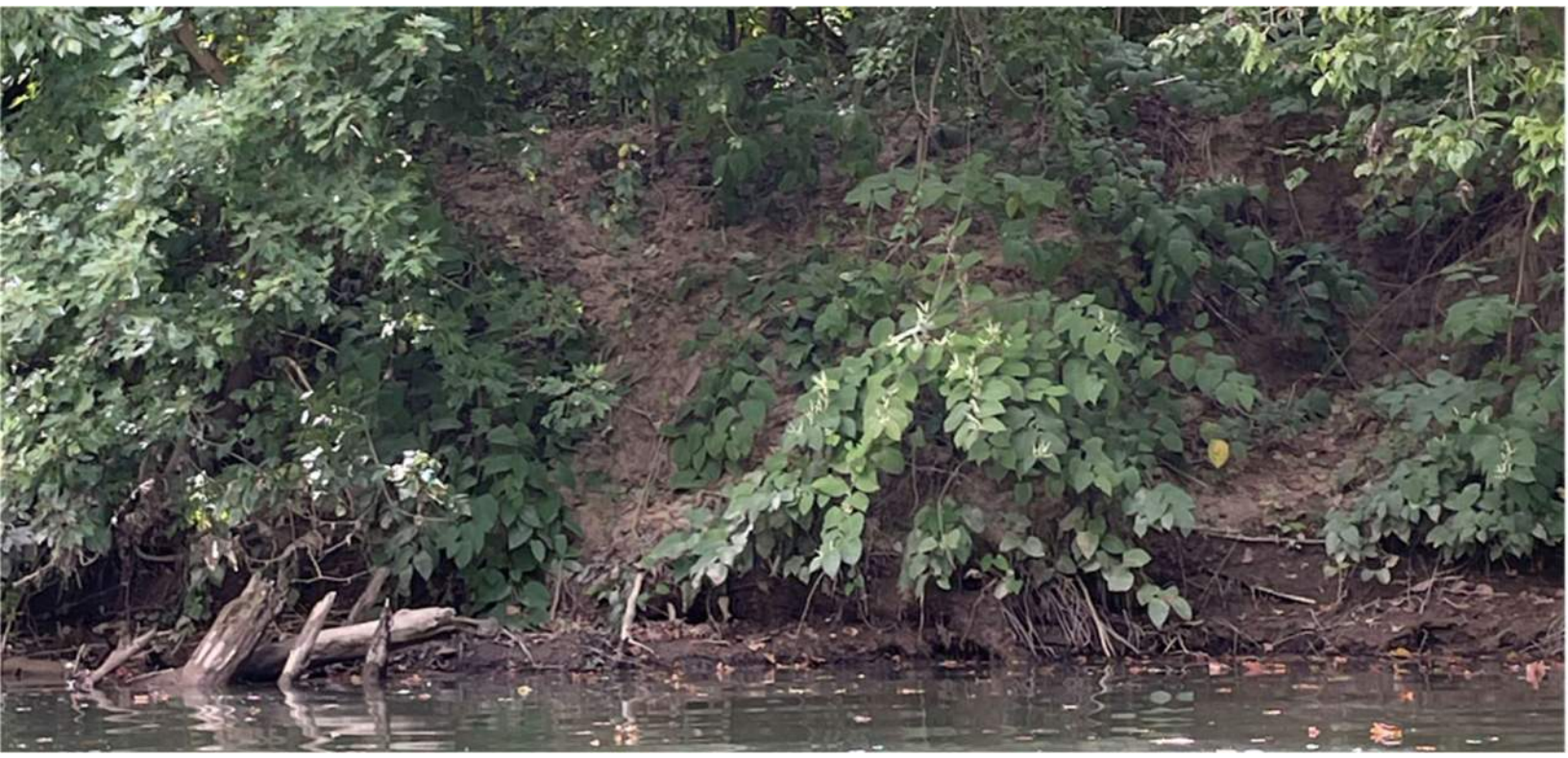


**Photo 9.** View of west bank of Coal River. Note steep slopes and lack of understory vegetation that results in bare areas. Narrow band of vertical scarp present at low-flow water line (typical throughout).



**Photo 10.** View of east bank of Coal River near private residence. Note features such as retaining walls and riprap which appear to be attempts to stabilize the riverbanks.



**Photo 11.** West bank encroaches on roadway (Coal River Road) with little margin. Culverts are sometimes in bad condition, lack headwalls, and create headcuts in the bank that further threaten the roadway infrastructure.



**Photo 12.** View shows fallen/leaning trees along west bank of Coal River next to roadway (Coal River Road), indicating possible loss of bank material.



**Photo 13.** View of west riverbank.  Note light scarp at low-flow water line.



**Photo 14.** View of west riverbank.  Note steep slopes, lack of understory plants, and band of vertical scarp along low-flow water line.




**Photo 15.** View of culvert outfall into Coal River (culvert location denoted with red arrow). Culvert appears to be contributing to sediment deposition into the river system, as well as contributing to erosion and head cutting along the west  bank of the river.



**Photo 16.** View of private residence along west bank of Coal River. Note hand-placed stone at water line which appears to be intended as a riverbank stabilization measure. High foot traffic areas result in bare ground.



**Photo 17.** View of storm pipe outfall into the Coal River. Note scour and bare riverbank areas around culvert outfall.



**Photo 18.** View of collapsed wooden dock along west riverbank.



**Photo 19.** Bare areas and construction debris (possibly a do-it-yourself attempt to improve bank stability), at what appears to be a location that is used by the public to access the Coal River.



**Photo 20.** View of headcutting and bank erosion at culvert outfall along west riverbank.



**Photo 21.** Area along west riverbank which has been cleared of trees. Lack of deep-rooted plants decreases riverbank stability.



**Photo 22.** View of east riverbank. Note steep slopes, minimal understory vegetation, and band of scarp along low-flow water line.



**Photo 23.** View of Coal River. Note large woody debris (i.e. fallen tree) in river, indicating possible bank instability.

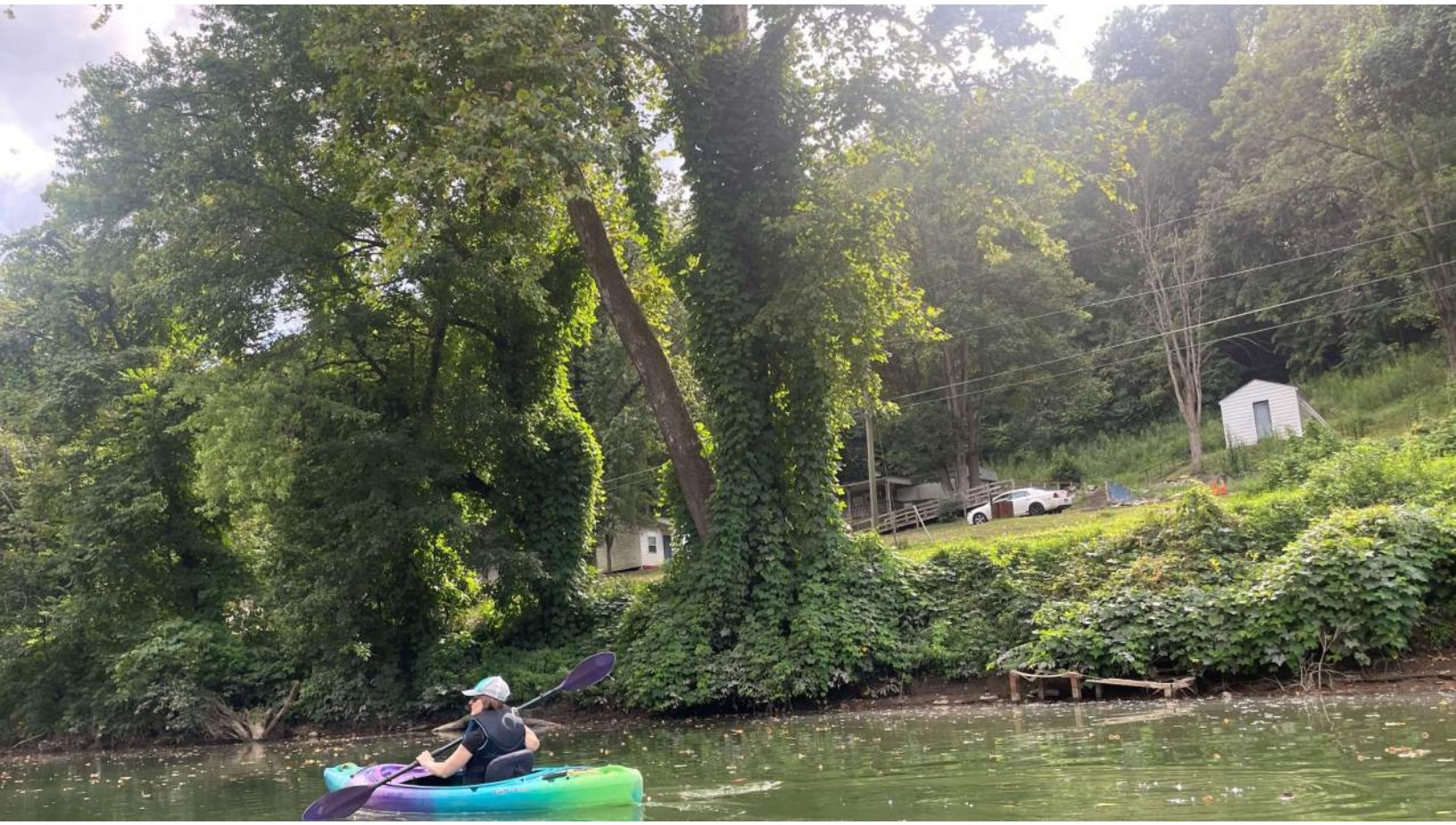


**Photo 24.** View of invasive Kudzu (*Pueraria montana*) growth. Previous human activity, such as tree clearing and mowing too close to banks, can exacerbate bank instability and encourage growth of invasive species.



**Photo 25.** View of west riverbank showing vegetated point bar, which can improve bank stability.



**Photo 26.** View of west riverbank showing vegetated point bar, which can improve bank stability.



**Photo 27.** View of invasive Bamboo stand on east riverbank.



**Photo 28.** Typical view of riverbank. Note steep slopes, lack of understory vegetation, and band of scarp at low-flow water line.



**Photo 29.** View of riverbank which is being mowed, eliminating the vegetative riparian buffer. Lack of trees and understory vegetation can compromise bank stability.



**Photos 30.** View of riverbank area containing bare areas (possibly from foot traffic), steep slopes, large boulders and construction debris.



**Photo 31.** View of riverbank area containing bare areas (possibly from foot traffic), steep slopes, large boulders and construction debris. Photo 31 shows area just to the left of Photo 30.



**Photo 32.** View of private property along Coal River Road. Tree removal and mowing activities have eliminated the riparian buffer. Bare areas observed on bank, possibly from foot traffic.



**Photo 33.** View of loose soil and scarp along riverbank at low-flow line.

# APPENDIX C

## THREATENED AND ENDANGERED SPECIES COORDINATION

# United States Department of the Interior

FISH AND WILDLIFE SERVICE
West Virginia Ecological Services Field Office
6263 Appalachian Highway
Davis, WV 26260-8061
Phone: (304) 866-3858 Fax: (304) 866-3852

In Reply Refer To: 10/21/2025 13:55:15 UTC
Project Code: 2026-0005890
Project Name: Coal River Dam Removal plus 2 miles up and down stream

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). If you determine that other federally protected species not listed in this Official Species List are present in your action area, you are still responsible to analyze your potential effects to those species and consult with the U.S. Fish and Wildlife Service if consultation is required.

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf

**Migratory Birds**: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see https://www.fws.gov/program/migratory-bird-permit/what-we-do.

It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of

this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

# OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

**West Virginia Ecological Services Field Office**
6263 Appalachian Highway
Davis, WV 26260-8061
(304) 866-3858

# PROJECT SUMMARY

Project Code: 2026-0005890
Project Name: Coal River Dam Removal plus 2 miles up and down stream
Project Type: Restoration / Enhancement of Waterbody
Project Description: Coal River Dam Removal Project, including 2 miles up and down stream of the dam.
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@38.335269,-81.84151035605322,14z




Counties: Kanawha County, West Virginia

# ENDANGERED SPECIES ACT SPECIES

There is a total of 8 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 3 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

## MAMMALS

| NAME | STATUS |
|---|---|
| Gray Bat *Myotis grisescens* | Endangered |
| No critical habitat has been designated for this species.<br>Species profile: https://ecos.fws.gov/ecp/species/6329 | |
| Indiana Bat *Myotis sodalis* | Endangered |
| There is **final** critical habitat for this species. Your location does not overlap the critical habitat.<br>This species only needs to be considered under the following conditions:<br>▪ All activities in this location should consider potential effects to this species. This project is not within a known-use area, but potentially occupied habitat may exist. Please contact the WVFO for further coordination.<br>Species profile: https://ecos.fws.gov/ecp/species/5949 | |
| Northern Long-eared Bat *Myotis septentrionalis* | Endangered |
| No critical habitat has been designated for this species.<br>Species profile: https://ecos.fws.gov/ecp/species/9045 | |
| Tricolored Bat *Perimyotis subflavus* | Proposed Endangered |
| No critical habitat has been designated for this species.<br>Species profile: https://ecos.fws.gov/ecp/species/10515 | |

## CLAMS

| NAME | STATUS |
|---|---|
| Pink Mucket (pearlymussel) *Lampsilis abrupta* | Endangered |
| No critical habitat has been designated for this species.<br>This species only needs to be considered under the following conditions:<br>▪ This project is in close proximity of a stream known to support this species; all activities in this location should consider potential effects to the species. Review the project design guidelines for information about next steps and contacting the WVFO.<br>Species profile: https://ecos.fws.gov/ecp/species/7829<br>General project design guidelines:<br>https://ipac.ecosphere.fws.gov/project/WOUASBSZTZAQNHC42YDRLOXZD4/documents/generated/6463.pdf | |
| Round Hickorynut *Obovaria subrotunda* | Threatened |
| There is **final** critical habitat for this species. Your location does not overlap the critical habitat.<br>Species profile: https://ecos.fws.gov/ecp/species/9879 | |
| Sheepnose Mussel *Plethobasus cyphyus* | Endangered |
| There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat.<br>This species only needs to be considered under the following conditions:<br>▪ This project occurs within a watershed known to support this species. Review the project design guidelines for more information about next steps and contacting the WVFO.<br>Species profile: https://ecos.fws.gov/ecp/species/6903<br>General project design guidelines:<br>https://ipac.ecosphere.fws.gov/project/WOUASBSZTZAQNHC42YDRLOXZD4/documents/generated/6465.pdf | |

## INSECTS

| NAME | STATUS |
|---|---|
| Monarch Butterfly *Danaus plexippus*<br>There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat.<br>Species profile: https://ecos.fws.gov/ecp/species/9743 | Proposed Threatened |

## CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

# USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

# BALD & GOLDEN EAGLES

Bald and Golden Eagles are protected under the Bald and Golden Eagle Protection Act [2] and the Migratory Bird Treaty Act (MBTA) [1]. Any person or organization who plans or conducts activities that may result in impacts to Bald or Golden Eagles, or their habitats, should follow appropriate regulations and consider implementing appropriate avoidance and minimization measures, as described in the various links on this page.

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1. The Bald and Golden Eagle Protection Act of 1940.
2. The Migratory Birds Treaty Act of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

Bald and Golden Eagles are protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act (MBTA). Any person or organization who plans or conducts activities that may result in impacts to Bald or Golden Eagles, or their nests, should follow appropriate regulations and implement required avoidance and minimization measures, as described in the various links on this page.

The data in this location indicates that no eagles have been observed in this area. This does not mean eagles are not present in your project area, especially if the area is difficult to survey.

Please review the 'Steps to Take When No Results Are Returned' section of the Supplemental Information on Migratory Birds and Eagles document to determine if your project is in a poorly surveyed area. If it is, you may need to rely on other resources to determine if eagles may be present (e.g. your local FWS field office, state surveys, your own surveys).

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats, should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

# MIGRATORY BIRDS

The Migratory Bird Treaty Act (MBTA) [1] prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the Department of Interior U.S. Fish and Wildlife Service (Service).

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the "Probability of Presence Summary" below to see when these birds are most likely to be present and breeding in your project area.

| NAME | BREEDING SEASON |
|---|---|
| Black-capped Chickadee *Poecile atricapillus practicus*<br>This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA<br>https://ecos.fws.gov/ecp/species/10645 | Breeds Apr 10 to Jul 31 |
| Cerulean Warbler *Setophaga cerulea*<br>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.<br>https://ecos.fws.gov/ecp/species/2974 | Breeds Apr 27 to Jul 20 |
| Chimney Swift *Chaetura pelagica*<br>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.<br>https://ecos.fws.gov/ecp/species/9406 | Breeds Mar 15 to Aug 25 |
| Red-headed Woodpecker *Melanerpes erythrocephalus*<br>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.<br>https://ecos.fws.gov/ecp/species/9398 | Breeds May 10 to Sep 10 |

| NAME | BREEDING SEASON |
|---|---|
| Rusty Blackbird *Euphagus carolinus*<br>This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA<br>https://ecos.fws.gov/ecp/species/9478 | Breeds elsewhere |
| Wood Thrush *Hylocichla mustelina*<br>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.<br>https://ecos.fws.gov/ecp/species/9431 | Breeds May 10 to Aug 31 |

# PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

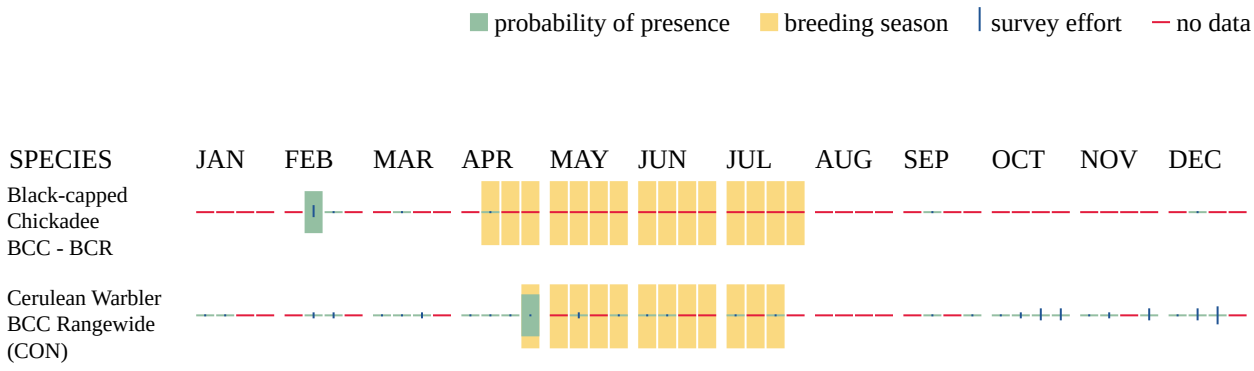
**Probability of Presence** (▪)

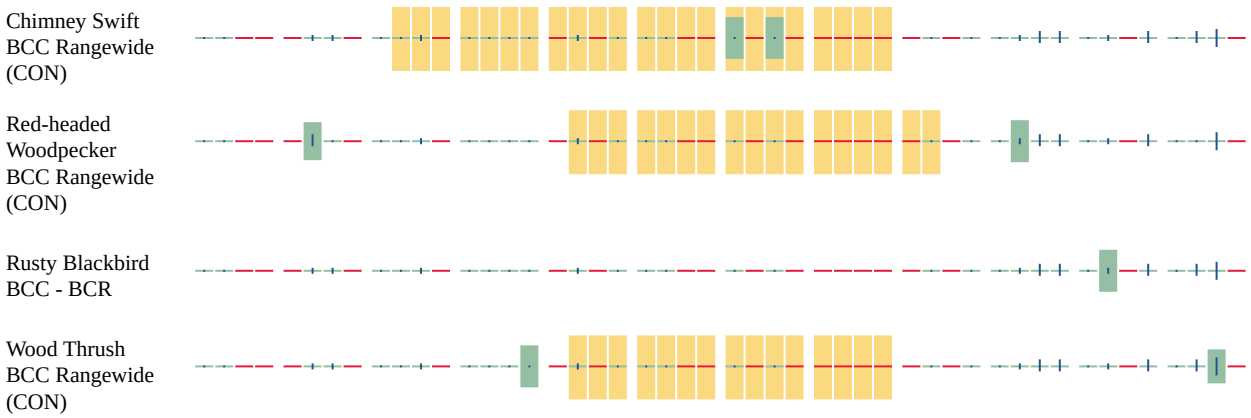
Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

**Breeding Season** (▪)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

**Survey Effort** (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

**No Data** (–)
A week is marked as having no data if there were no survey events for that week.






Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide avoidance and minimization measures for birds
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

# WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

FRESHWATER FORESTED/SHRUB WETLAND

- PFO1C
- PFO1A

RIVERINE

- R3UBH
- R2UBH

# IPAC USER CONTACT INFORMATION


| | |
|---|---|
| Agency: | Natural Resources Conservation Service |
| Name: | Kyle Aldinger |
| Address: | 1550 Earl L Core Road |
| Address Line 2: | Suite 200 |
| City: | Morgantown |
| State: | WV |
| Zip: | 26505 |
| Email | kyle.aldinger@usda.gov |
| Phone: | 3042847595 |

January 14, 2026

Hannah Thacker
Kyle Aldinger
Titus Smith
Water Resources Planning Specialist
NRCS | West Virginia
Natural Resources Conservation Service
473 Ragland Rd
Beckley, WV, 25801
hannah.thacker@usda.gov
kyle.aldinger@usda.gov
titus.smith@usda.gov

Dear Ms Thacker, Mr. Aldinger, and Mr. Smith,

We have reviewed Natural Heritage Program files for information on rare, threatened, and endangered (RTE) species and sensitive habitats for the area of the proposed Coal River action area in Kanawha County.

According to our database, there is one bat capture and a few sensitive habitats within the project buffer as listed on the table below.

| Species (Latin Name) or Habitat Feature | Common Name | Location/Description | Status |
|---|---|---|---|
| *Perimyotis subflavus* | Tricolored bat | (1) 2014 summer capture 3 mile buffer (outer tier) | Federal: proposed to be listed |
| Coal River | | crosses from north end through south end of project | Federal: endangered group 2-2.5 small to mid-sized mussel stream<br><br>State: DNR designated high quality warmwater stream |
| 2 Palustrine Forested Palustine Scrub Shrub wetlands | | cross into northeastern part of project | NWI: wetlands |

The information provided is the result of a search of the following bat buffers: summer occurrences, captures, and hibernacula for each of the Indiana bat, northern long-eared bat,

Virginia big-eared bat, and tricolored bat. Data provided include and differentiate between the inner- and outer-tiers of capture, roost and hibernacula records, respectively, and identify anthropogenic sites such as bridges and culverts. All buffer types and distances are consistent with U.S. Fish and Wildlife Service values as of December 13th, 2024. Please note that due to changes in the U.S. Fish and Wildlife Service guidance, and concurrent updates to the WVDNR records database, new records request responses may differ from past requests. In particular, the current U.S. Fish and Wildlife Service guidance reduces northern long-eared bat and tricolored bat buffers at culverts, bridges, and at all tricolored bat hibernacula. The information provided above is the product of a database search and retrieval. This information does not satisfy other consultation or permitting requirements for disturbances to the natural resources of the state, and further consultation may be required.

The information provided above is the product of a database search and retrieval. This information does not satisfy other consultation or permitting requirements for disturbances to the natural resources of the state, and further consultation may be required.

Additionally, any concurrence requirements for federally listed species must come from the US Fish and Wildlife Service. The Wildlife Resources Section knows of no other surveys that have been conducted in the area for rare species or rare species habitat. Consequently, this response is based on information currently available and should not be considered a comprehensive survey of the area under review. This response is valid for two years.

Thank you for your inquiry, and should you have any questions please feel free to contact me at the number below, or Anne.M.Wakeford@wv.gov.

Sincerely,

Anne M. Wakeford

Anne M. Wakeford
Wildlife Biologist
Environmental Coordination
Operations Unit

# United States Department of the Interior

FISH AND WILDLIFE SERVICE
West Virginia Ecological Services Field Office
6263 Appalachian Highway
Davis, WV 26260-8061
Phone: (304) 866-3858 Fax: (304) 866-3852

In Reply Refer To: 02/13/2026 17:03:13 UTC
Project code: 2026-0005890
Project Name: Coal River Dam Removal plus 2 miles up and down stream

Federal Nexus: yes
Federal Action Agency (if applicable): Natural Resources Conservation Service

Subject: Technical assistance for 'Coal River Dam Removal plus 2 miles up and down stream'

Dear Hannah Thacker:

This letter records your determination using the Information for Planning and Consultation (IPaC) system provided to the U.S. Fish and Wildlife Service (Service) on February 13, 2026, for “Coal River Dam Removal plus 2 miles up and down stream” (here forward, Project). This project has been assigned Project Code 2026-0005890 and all future correspondence should clearly reference this number.

The Service developed the IPaC system and associated species’ determination keys in accordance with the Endangered Species Act of 1973 (ESA; 87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) and based on a standing analysis. All information submitted by the Project proponent into the IPaC must accurately represent the full scope and details of the Project. Failure to accurately represent or implement the Project as detailed in IPaC or the Northeast Determination Key (Dkey), invalidates this letter. ***Answers to certain questions in the DKey commit the project proponent to implementation of conservation measures that must be followed for the ESA determination to remain valid.***

To make a no effect determination, the full scope of the proposed project implementation (action) should not have any effects (either positive or negative effect(s)), to a federally listed species or designated critical habitat. Effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action. (See § 402.17). Under Section 7 of the ESA, if a federal action agency makes a no effect determination, no further consultation with, or concurrence from, the Service is required (ESA §7). If a proposed Federal action may affect a listed species or designated critical

habitat, formal consultation is required (except when the Service concurs, in writing, that a proposed action "is not likely to adversely affect (NLAA)" listed species or designated critical habitat [50 CFR §402.02, 50 CFR§402.13]).

The IPaC results indicated the following species is (are) potentially present in your project area and, based on your responses to the Service's Northeast DKey, you determined the proposed Project will have the following effect determinations:

| Species | Listing Status | Determination |
|---|---|---|
| Indiana Bat (*Myotis sodalis*) | Endangered | May affect |
| Pink Mucket (pearlymussel) (*Lampsilis abrupta*) | Endangered | May affect |
| Round Hickorynut (*Obovaria subrotunda*) | Threatened | May affect |
| Sheepnose Mussel (*Plethobasus cyphyus*) | Endangered | May affect |

Your project is located in habitat that is likely to have presence of the Indiana bat. We recommend Indiana Bat presence/absence surveys to determine whether bats are likely to be present in the project area. If you conduct presence/absence surveys, you can return to the Key and modify your answers to incorporate the results of your survey.
**Consultation with the Service is not complete.** Further consultation or coordination with the Service is necessary for those species or designated critical habitats with a determination of "May Affect". Please contact our West Virginia Ecological Services Field Office to discuss methods to avoid or minimize potential adverse effects to those species or designated critical habitats.

**Other Species and Critical Habitat that May be Present in the Action Area**

In addition to the species listed above, the following species and/or critical habitats may also occur in your project area and are not covered by this conclusion:

- Monarch Butterfly *Danaus plexippus* Proposed Threatened
- Northern Long-eared Bat *Myotis septentrionalis* Endangered
- Tricolored Bat *Perimyotis subflavus* Proposed Endangered

Please Note: If the Action may impact bald or golden eagles, additional coordination with the Service under the Bald and Golden Eagle Protection Act (BGEPA) (54 Stat. 250, as amended, 16 U.S.C. 668a-d) by the prospective permittee may be required. Please contact the Migratory Birds Permit Office, (413) 253-8643, or PermitsR5MB@fws.gov, with any questions regarding potential impacts to Eagles.

If you have any questions regarding this letter or need further assistance, please contact the West Virginia Ecological Services Field Office and reference the Project Code associated with this Project.

**Action Description**
You provided to IPaC the following name and description for the subject Action.

**1. Name**

Coal River Dam Removal plus 2 miles up and down stream

**2. Description**

The following description was provided for the project 'Coal River Dam Removal plus 2 miles up and down stream':

> Coal River Dam Removal Project, including 2 miles up and down stream of the dam.

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@38.33540295,-81.8413681679303,14z



# QUALIFICATION INTERVIEW

1. As a representative of this project, do you agree that all items submitted represent the complete scope of the project details and you will answer questions truthfully?

   *Yes*

2. Does the proposed project include, or is it reasonably certain to cause, intentional take of listed species?

   **Note:** This question could refer to research, direct species management, surveys, and/or studies that include intentional handling/encountering, harassment, collection, or capturing of any individual of a federally listed threatened, endangered, or proposed species.

   *No*

3. Is the action authorized, permitted, licensed, funded, or being carried out by a Federal agency in whole or in part?

   **Note:** for projects in Pennsylvania: Projects requiring authorization under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act would be considered as having a federal nexus. Since the U.S. Army Corps of Engineers (Corps) has issued the Pennsylvania State Programmatic General Permit (PASPGP), which may be verified by the PA Department of Environmental Protection or certain Conservation Districts, the need to receive a Corps authorization to perform the work under the PASPGP serves as a federal nexus. As such, if proposing to use the PASPGP, you would answer ‘yes’ to this question.

   *Yes*

4. Are you including in this analysis all impacts to federally listed species that may result from the entirety of the project (not just the activities under federal jurisdiction)?

   **Note:** If there are project activities that will impact listed species that are considered to be outside of the jurisdiction of the federal action agency submitting this key, contact your local Ecological Services Field Office to determine whether it is appropriate to use this key. If your Ecological Services Field Office agrees that impacts to listed species that are outside the federal action agency's jurisdiction will be addressed through a separate process, you can answer yes to this question and continue through the key.

   *Yes*

5. Are you the lead federal action agency or designated non-federal representative requesting concurrence on behalf of the lead Federal Action Agency?

   *Yes*

6. Is the lead federal action agency the Environmental Protection Agency (EPA) or Federal Communications Commission (FCC)?

   *No*

7. Is the lead federal action agency the Federal Energy Regulatory Commission (FERC)?

   *No*

8. Is the lead federal action agency the Natural Resources Conservation Service?

   *Yes*

9. Will the proposed project involve cutting more than 10 trees?

   *Yes*

10. Will the proposed project involve the use or storage of herbicide?

    *No*

11. Will the proposed project involve herbaceous native vegetation removal (including prescribed fire that would result in burning of plants) or mowing?

    *No*

12. Does any component of the project associated with this action include activities or structures that may pose a collision risk to **birds** (e.g., plane-based surveys, new or enlarged communication towers or broadcast towers, high voltage transmission lines, any type of towers with or without guy wires)?

    *No*

13. Will the proposed project involve demolition, rehabilitation, property elevation, renovation, and/or rebuilding of one or more existing buildings (e.g., residential, commercial and industrial buildings, or utilities)? Note: if project activities include modification of bridges and/or culverts, answer this question "No".

    *No*

14. Are federally listed freshwater mussels known to be present in the action area?

    **Note:** If unsure, contact the appropriate Ecological Services Field Office for additional information or answer "NO" and continue through the key.

    *No*

15. Did a qualified surveyor conduct a survey for freshwater mussels within the action area with the appropriate level of search effort according to local survey guidance?

    **Note:** Answer this question "Yes" if the project is located in WV and the action area is located outside the stream reaches where mussel surveys are required following the West Virginia Mussel Survey Protocol

    *No*

16. Will the proposed project result in **permanent** changes to surface water or groundwater quantity, retention, quality or timing?

    **Note**: Projects may affect stream flow, surface water, or groundwater through various activities such as; water withdrawal, water recharge, well drilling, infiltration impacts, stormwater outlets, hydropower production, water impoundments, intake structures, stream diversion, mining operations, dams, surface water drainage, or hydroelectric turbines.

    If a project only involves temporary and limited reductions in water that will not displace listed species or significantly alter their water availability (meaning there are no changes to their feeding, breeding, or sheltering), you can answer "No" to this question.

    This question specifically addresses the quantity of water in a stream. Other water quality issues, such as sedimentation and turbidity, will be covered in subsequent questions.

    *Yes*

17. Does the project include activity in or within 300 feet of a freshwater wetland?

    **Note:** This encompasses various project activities related to wetlands, including activities taking place within wetlands, activities occurring within 300 feet of wetlands that could impact them, and water withdrawals and/or discharge of contaminants, even if covered by a National Pollutant Discharge Elimination System (NPDES) permit.

    Examples of such activities include, but are not limited to; wetland draining, ditching, tilling, filling, excavation, stream diversion, impoundments, mowing, grazing vegetation, construction of access roads, creation of detention basins, installation of water or sewer lines, irrigation, increase of impervious surfaces, and application of pesticides, deicing agents, or fertilizers..

    *Yes*

18. Will the proposed project directly affect a streambed (below ordinary high water mark (OHWM)) of the stream?

    *Yes*

19. Will the proposed project bore underneath (directional bore or horizontal directional drill) a stream where listed species may be present?

    *No*

20. Will the proposed project involve a new point source discharge into a stream or change an existing point source discharge (e.g., outfalls; leachate ponds, fracking fluid) including changes to pH, temperature and/or chemical composition (e.g., choloride, nickel,etc.)?

    *Yes*

21. Will the proposed project involve the removal of sediment or debris, dredging or in-stream gravel mining where listed species may be present?

    *Yes*

22. Will the proposed project involve the creation of a new water-borne contaminant source where listed species may be present?

    **Note:** New water-borne contaminant sources occur through improper storage, usage, or creation of chemicals. For example: leachate ponds and pits containing chemicals that are not NSF/ANSI 60 compliant have contaminated waterways. Sedimentation will be addressed in a separate question.

    *No*

23. Will the proposed project involve perennial stream loss, in a stream or tributary of a stream where listed species may be present, that would require an individual permit under 404 of the Clean Water Act?

    *No*

24. Will the proposed project involve pesticide use or storage within 200 feet of a karst feature or perennial stream bank where aquatic listed species may be present?

    *No*

25. Will the proposed project include activities that could negatively affect fish movement temporarily or permanently (including fish stocking, harvesting, or creation of barriers to fish passage).

    *Yes*

26. Will the proposed project involve earth moving or other ground disturbance that could cause erosion and sedimentation, and/or contamination within 300 feet of a freshwater wetland or along a stream?

    **Note**: Answer "Yes" to this question if erosion and sediment control measures will be used.

    *Yes*

27. Will the proposed project impact streams or tributaries of streams where listed species may be present through activities such as, but not limited to, valley fills, large-scale vegetation removal that could result in ground destabilization, and/or change in site topography?

    *No*

28. Will the proposed project involve vegetation removal within 300 feet of a perennial stream bank where aquatic listed species may be present?

    *Yes*

29. Will erosion and sedimentation control Best Management Practices (BMPs) associated with applicable state and/or Federal permits, be applied to the project?

    **Note:** If BMPs have been provided by and/or coordinated with and approved by the appropriate Ecological Services Field Office, answer "Yes" to this question.

    *Yes*

30. Is the project being funded, lead, or managed in whole or in part by U.S Fish and Wildlife Restoration and Recovery Program (e.g., Partners, Coastal, Fisheries, Wildlife and Sport Fish Restoration, Refuges)?

    *No*

31. [Semantic] Is the project located on a Group 4 stream: the Ohio River downstream of Hannibal Locks and Dam, Little Kanawha River (slack-water section adjoining the Ohio River), and/or the Kanawha River downstream of Kanawha Falls?

    **Automatically answered**
    *No*

32. Have you received a technical assistance communication (email or letter) from the West Virginia Field office?

    *No*

33. Does any component of the project associated with this action include activities or structures that may pose a collision risk to **bats** (e.g., plane-based surveys, land-based or offshore wind)?

    *No*

34. Will the proposed project affect wetlands in areas where **bats** may be present?

    *Yes*

35. Will the proposed project involve blasting where bats may be present?

    *No*

36. Does the project intersect the Indiana bat species list area?

    **Automatically answered**

    *Yes*

37. Are there any caves, mines, or mine features that are suitable for hibernating Indiana bats within the area expected to be impacted by the project?

    *No*

38. Has a presence/probable absence bat survey following the Service's Range-wide Indiana Bat and Northern long-eared Bat Survey Guidelines been conducted within the action area?

    *No*

39. Does the project involve removal or modification of a human-made structure (barn, house, or other building) known or suspected to contain roosting bats? **Note:** Most maintenance and general human disturbance in and around structures will not affect Indiana bats as bats roosting in human structures are adjusted to a certain level of routine noise and are generally expected to roost away from areas with excessive disturbance. Answer 'no' if the proposed action will not include disturbance to human structures known or suspected to contain roosting bats or if the structure does not offer suitable roosting habitat for northern long-eared bats. If unsure, answer 'yes.'

    *No*

40. Does the project include removal/modification of an existing culvert?

    *No*

41. Does the project include removal/modification of an existing bridge?

    *No*

42. Are trees present within 1000 feet of the action area?

    Note: If there are trees within the action area that are of a sufficient size to be potential roosts for bats (i.e., live trees and/or snags ≥5 inches dbh (12.7 centimeter), answer "Yes". If unsure, answer "Yes." Or refer to Appendix A of the Range-wide Indiana Bat and Northern Long-Eared Bat Survey Guidelines for definitions and an assessment form that will assist you in determining if suitable habitat is present within your project's action area. Suitable summer habitat for Indiana bat consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥5 inches dbh (12.7 centimeter) that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet (305 meters) of other forested/wooded habitat.

    *Yes*

43. Will the project include tree cutting, other means of knocking down or bringing down trees, or tree trimming?

    *Yes*

44. Is the project related to the production of coal, including projects that support the mining of coal, as well as the production and/or distribution of energy produced from coal?

    *No*

45. Is the project a linear project (e.g., pipelines, utility rights-of-way, roads etc.)?

    *No*

46. Does the project area intersect the species list area of Sheepnose?

    **Automatically answered**
    *Yes*

47. [Hidden Semantic] Does the project area intersect the species list area of the Pink Mucket?

    **Automatically answered**
    *Yes*

48. [Hidden Semantic] Does the project area intersect the species list area of Round Hickorynut?

    **Automatically answered**
    *Yes*

49. Does the project intersect the Small-anthered bittercress species list area?

    **Automatically answered**
    *No*

50. Does the project intersect the Smooth Coneflower species list area?

    **Automatically answered**
    *No*

51. Do you have any other documents that you want to include with this submission?

    *Yes*

    ***SUBMITTED DOCUMENTS***

    - *WVDNR Heritage Report on TE Species in Study Area.pdf* *https://ipac.ecosphere.fws.gov/project/WOUASBSZTZAQNHC42YDRLOXZD4/projectDocuments/176713103*

# PROJECT QUESTIONNAIRE

1. Approximately how many acres of trees would the proposed project remove?

   *0.1*

2. Approximately how many total acres of disturbance are within the disturbance/ construction limits of the proposed project?

   *3.5*

3. Briefly describe the habitat within the construction/disturbance limits of the project site.

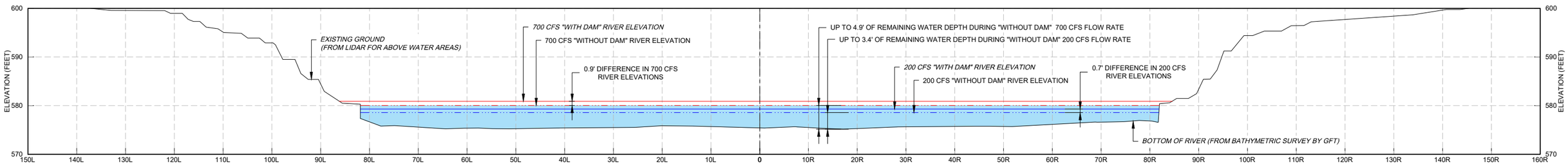
   *Habitat consists of riverine waterway and some deciduous trees leaning into the disturbance limits.*

# IPAC USER CONTACT INFORMATION

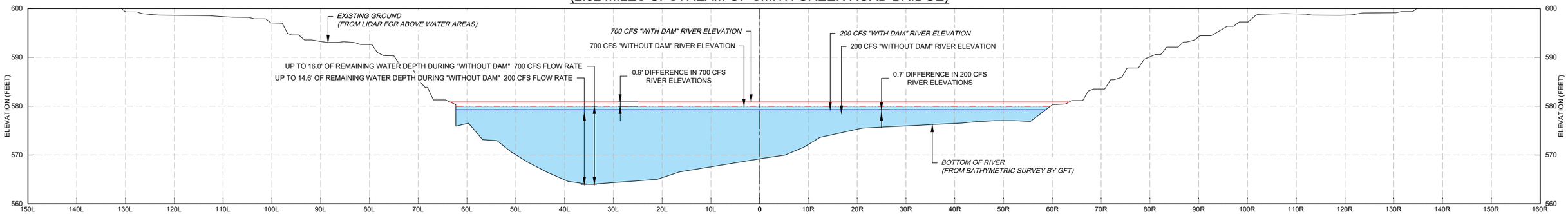
Agency: Natural Resources Conservation Service
Name: Hannah Thacker
Address: 465 Ragland Rd
City: Beckley
State: WV
Zip: 25801
Email hannah.thacker@usda.gov
Phone: 3043761178

# APPENDIX D

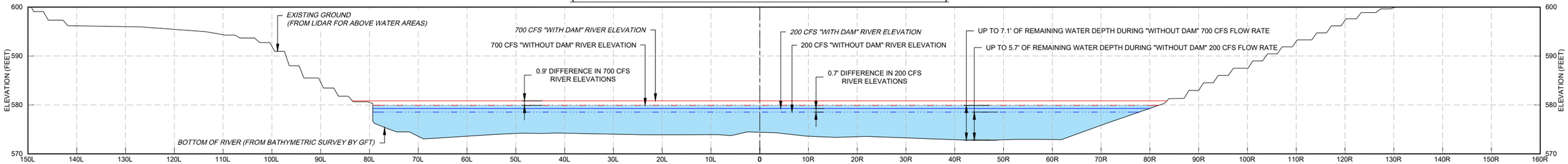
## RIVER CROSS SECTIONS SHOWING THE “WITH DAM” AND “WITHOUT DAM’ RIVER ELEVATIONS



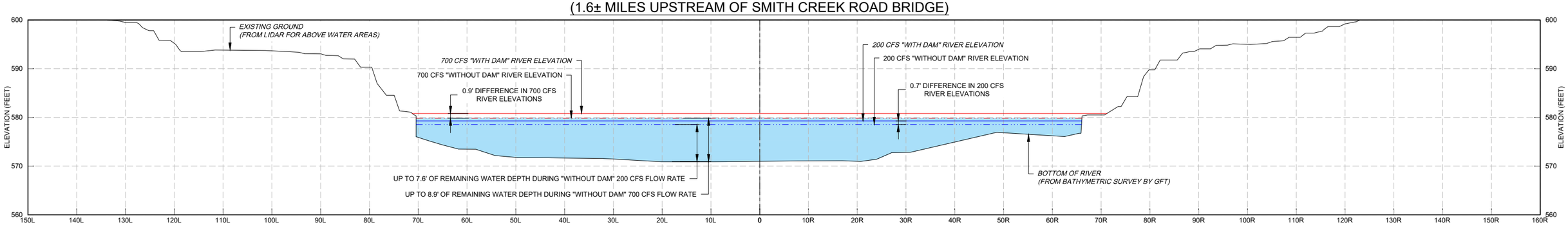

## HEC-RAS SECTION AZ
## (2.3± MILES UPSTREAM OF SMITH CREEK ROAD BRIDGE)




## HEC-RAS SECTION AY
## (1.9± MILES UPSTREAM OF SMITH CREEK ROAD BRIDGE)




## HEC-RAS SECTION AX
## (1.6± MILES UPSTREAM OF SMITH CREEK ROAD BRIDGE)




## HEC-RAS SECTION AW
## (1.2± MILES UPSTREAM OF SMITH CREEK ROAD BRIDGE)

LEGEND:

- "WITH DAM" RIVER ELEVATION - 50% RIVER FLOW RATE OF 700 CFS
- "WITHOUT DAM" RIVER ELEVATION - 50% RIVER FLOW RATE OF 700 CFS
- "WITH DAM" RIVER ELEVATION - RIVER FLOW RATE OF 200 CFS
- "WITHOUT DAM" RIVER ELEVATION - RIVER FLOW RATE OF 200 CFS
- REMAINING WATER DURING THE "WITHOUT DAM" SCENARIO WITH A RIVER FLOW RATE OF 700 CFS

10 -0- 10 20
SCALE IN FEET

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REVISIONS

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| DRAWN | CHECKED | APPROVED |
| BSM | ECN | PGS |

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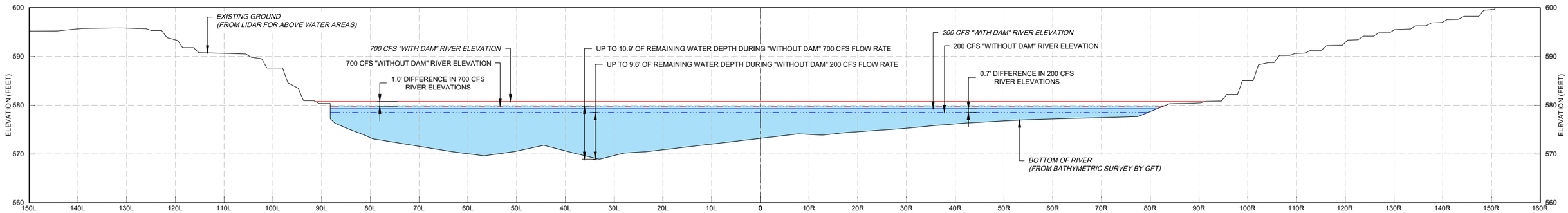
CAPITOL CONSERVATION DISTRICT
CROSS LANES, WV

WATERSHED PLAN-EA FOR THE
COAL RIVER WATERSHED

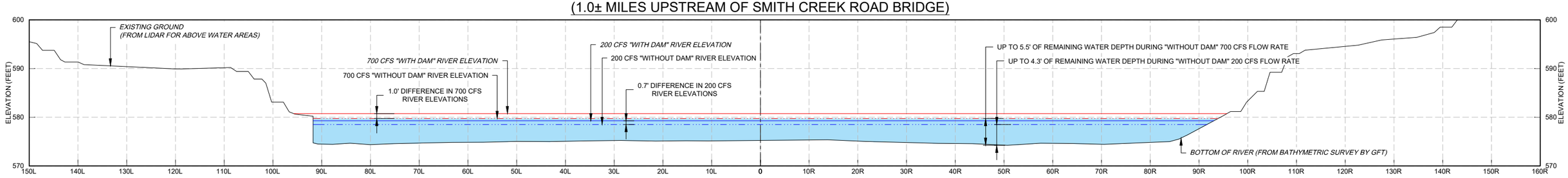
RIVER CROSS SECTIONS SHOWING
WITH AND WITHOUT DAM WATER SURFACE
SHEET 1 OF 4

| JOB NO. | SHEET NO. |
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| DATE | DRAWING NO. |
| JAN. 2026 | 1 OF 4 |

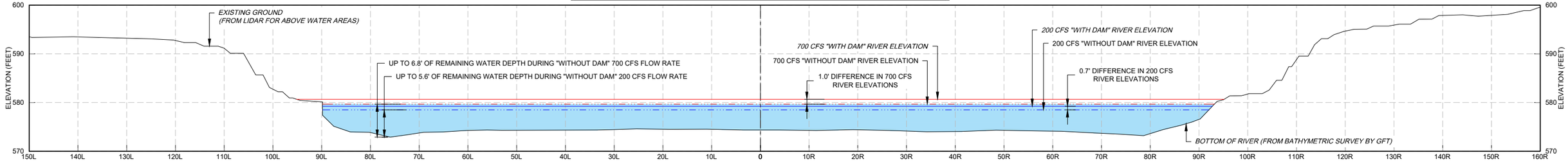
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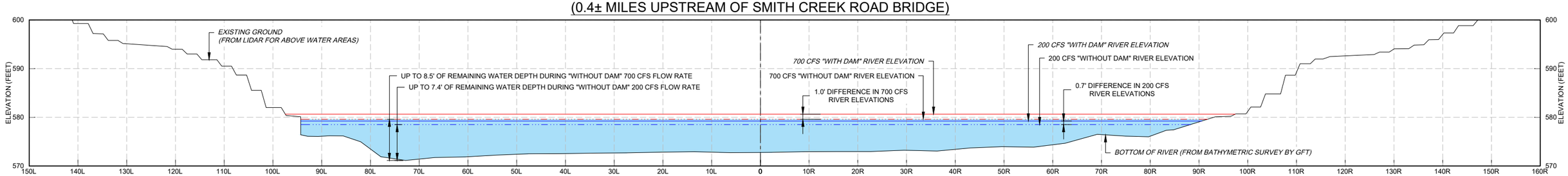

## HEC-RAS SECTION AV
## (1.0± MILES UPSTREAM OF SMITH CREEK ROAD BRIDGE)




## HEC-RAS SECTION AU
## (0.6± MILES UPSTREAM OF SMITH CREEK ROAD BRIDGE)




## HEC-RAS SECTION AT
## (0.4± MILES UPSTREAM OF SMITH CREEK ROAD BRIDGE)




## HEC-RAS SECTION AS
## (200'± UPSTREAM OF SMITH CREEK ROAD BRIDGE)

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LEGEND:

- "WITH DAM" RIVER ELEVATION - 50% RIVER FLOW RATE OF 700 CFS
- "WITHOUT DAM" RIVER ELEVATION - 50% RIVER FLOW RATE OF 700 CFS
- "WITH DAM" RIVER ELEVATION - RIVER FLOW RATE OF 200 CFS
- "WITHOUT DAM" RIVER ELEVATION - RIVER FLOW RATE OF 200 CFS
- REMAINING WATER DURING THE "WITHOUT DAM" SCENARIO WITH A RIVER FLOW RATE OF 700 CFS

10 -0- 10 20
SCALE IN FEET

| NO. | DESCRIPTION | DATE | BY |
|---|---|---|---|
| | REVISIONS | | |

| DESIGNED | CADD | SCALE |
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| DRAWN | CHECKED | APPROVED |
| BSM | ECN | PGS |

GANNETT FLEMING

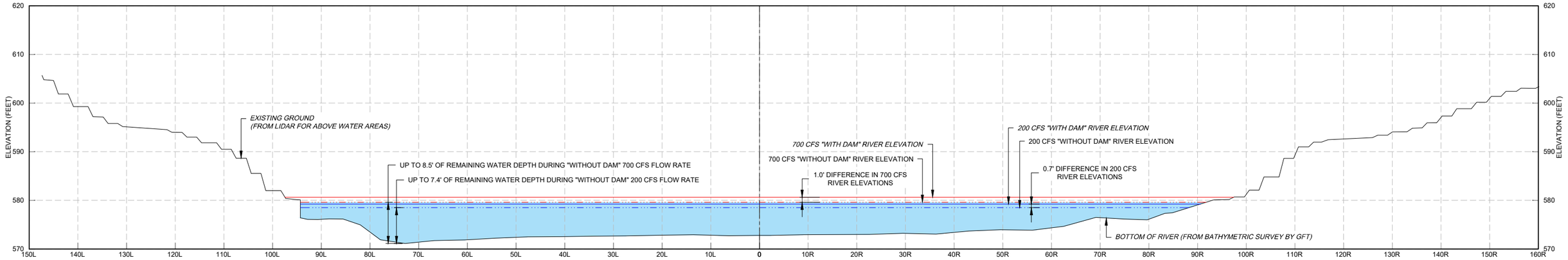
CAPITOL CONSERVATION DISTRICT
CROSS LANES, WV

WATERSHED PLAN-EA FOR THE
COAL RIVER WATERSHED

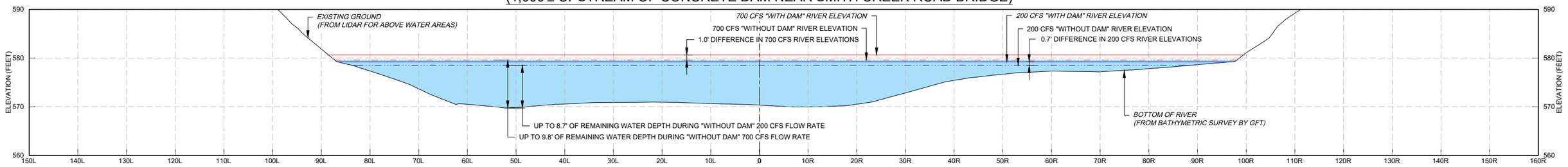
RIVER CROSS SECTIONS SHOWING
WITH AND WITHOUT DAM WATER SURFACE
SHEET 2 OF 4

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|---|---|
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| JAN. 2026 | 2 OF 4 |

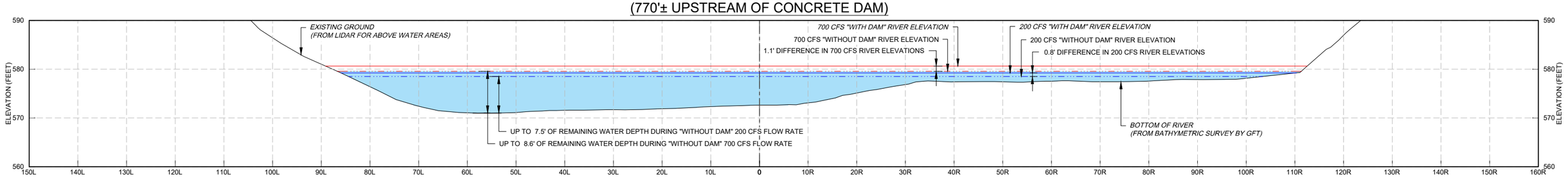
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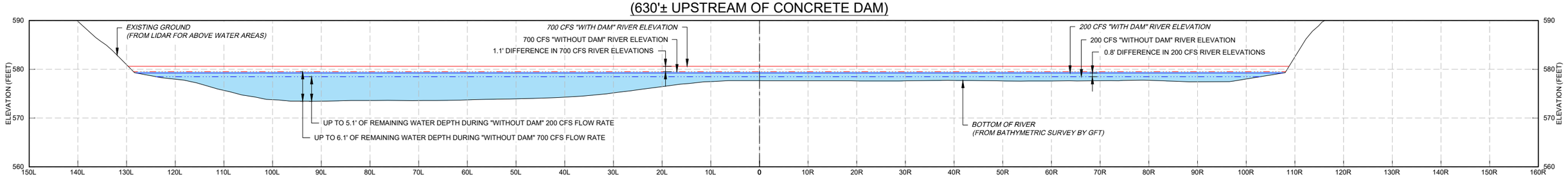

## HEC-RAS SECTION STA. 34+932
## (1,000'± UPSTREAM OF CONCRETE DAM NEAR SMITH CREEK ROAD BRIDGE)




## HEC-RAS SECTION AR
## (770'± UPSTREAM OF CONCRETE DAM)




## HEC-RAS SECTION STA. 34+572
## (630'± UPSTREAM OF CONCRETE DAM)




## HEC-RAS SECTION STA. 34+378
## (435'± UPSTREAM OF CONCRETE DAM)

LEGEND:

- "WITH DAM" RIVER ELEVATION - 50% RIVER FLOW RATE OF 700 CFS
- "WITHOUT DAM" RIVER ELEVATION - 50% RIVER FLOW RATE OF 700 CFS
- "WITH DAM" RIVER ELEVATION - RIVER FLOW RATE OF 200 CFS
- "WITHOUT DAM" RIVER ELEVATION - RIVER FLOW RATE OF 200 CFS
- REMAINING WATER DURING THE "WITHOUT DAM" SCENARIO WITH A RIVER FLOW RATE OF 700 CFS

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10 -0- 10 20
SCALE IN FEET

| NO. | DESCRIPTION | DATE | BY |
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REVISIONS

| DESIGNED | CADD | SCALE |
|---|---|---|
| ECN | BSM | AS SHOWN |
| DRAWN | CHECKED | APPROVED |
| BSM | ECN | PGS |

GANNETT FLEMING

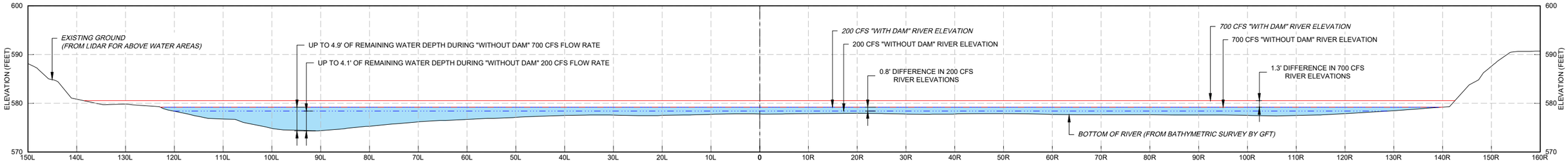
CAPITOL CONSERVATION DISTRICT
CROSS LANES, WV

WATERSHED PLAN-EA FOR THE
COAL RIVER WATERSHED

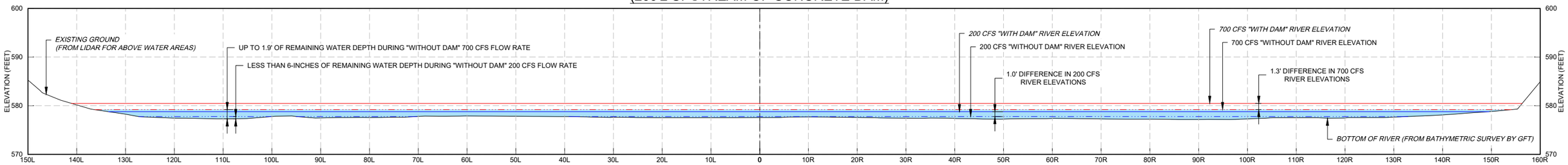
RIVER CROSS SECTIONS SHOWING
WITH AND WITHOUT DAM WATER SURFACE
SHEET 3 OF 4

| JOB NO. | SHEET NO. |
|---|---|
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| DATE | DRAWING NO. |
| JAN. 2026 | 3 OF 4 |

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HEC-RAS SECTION STA. 34+154
(200'± UPSTREAM OF CONCRETE DAM)




HEC-RAS SECTION AQ
(55'± UPSTREAM OF CONCRETE DAM)

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LEGEND:

"WITH DAM" RIVER ELEVATION - 50% RIVER FLOW RATE OF 700 CFS

"WITHOUT DAM" RIVER ELEVATION - 50% RIVER FLOW RATE OF 700 CFS

"WITH DAM" RIVER ELEVATION - RIVER FLOW RATE OF 200 CFS

"WITHOUT DAM" RIVER ELEVATION - RIVER FLOW RATE OF 200 CFS

REMAINING WATER DURING THE "WITHOUT DAM" SCENARIO WITH A RIVER FLOW RATE OF 700 CFS

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SCALE IN FEET

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| DRAWN | CHECKED | APPROVED |
| BSM | ECN | PGS |

GANNETT FLEMING

CAPITOL CONSERVATION DISTRICT
CROSS LANES, WV

WATERSHED PLAN-EA FOR THE
COAL RIVER WATERSHED

RIVER CROSS SECTIONS SHOWING
WITH AND WITHOUT DAM WATER SURFACE
SHEET 4 OF 4

| JOB NO. | SHEET NO. |
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