

**National Park Service
U.S. Department of the Interior**

**Catoctin Mountain Park
Thurmont, Maryland**



Parkwide Utility Infrastructure Replacement

Catoctin Mountain Park

Environmental Assessment

August 2021



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PURPOSE AND NEED

The National Park Service (NPS) proposes to replace parkwide utility infrastructure in Catoctin Mountain Park (CATO or Park), an administrative unit of the national park system located in Frederick County, Maryland. This project would replace aging (ranging from 25 to 80 years old) park owned and operated infrastructure systems that include potable water, sanitary sewer, electric power, and communications. The project is intended to comprehensively correct serious deficiencies that directly affect the natural environment, park personnel, and visitors and would be brought up to meet local, state, and national operational standards. The project is needed to eliminate excessive groundwater infiltration into the aged sewer collection system and assure code compliant discharges. It would replace an outdated potable water treatment and distribution system including rehabilitation of fire hydrants. The communication network would be significantly upgraded, eliminating redundant systems, and linking park wide business offices. Additionally, the integrated communication technology would allow facilities management professionals to monitor real-time water flow, treatment, storage, and distribution systems. It would replace unreliable/non-functional cell-based telemetry. The aging infrastructure has caused:

- Drinking water compliance issues
 - Measurable amounts of chromium, copper, lead, nickel, and nitrite
 - Maximum Contaminant Level exceedances for copper
- System inefficiencies
 - New connections patched in system built 80 years ago
 - Water tanks inaccessible for maintenance
- Leaking water tanks
- Infiltration and inflow in sewer system
- Existing polychlorinated biphenyl containing transformers
- Unreliable telecommunication system

This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended, and implementing regulations, 40 Code of Federal Regulations (CFR) Parts 1500-1508, NPS Director's Order 12: Conservation Planning, Environmental Impact Analysis, and Decision-making, and the accompanying NEPA Handbook. Compliance with Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended, is being conducted concurrently with the NEPA process.

PROJECT LOCATION

The proposals would take place throughout the park, focusing on the following locations (Figure 1, following page):

- Owens Creek Campground
- Camp Greentop
- Camp Round Meadow
- Camp Misty Mount
- Jim Brown Wells
- Poplar Grove Wells

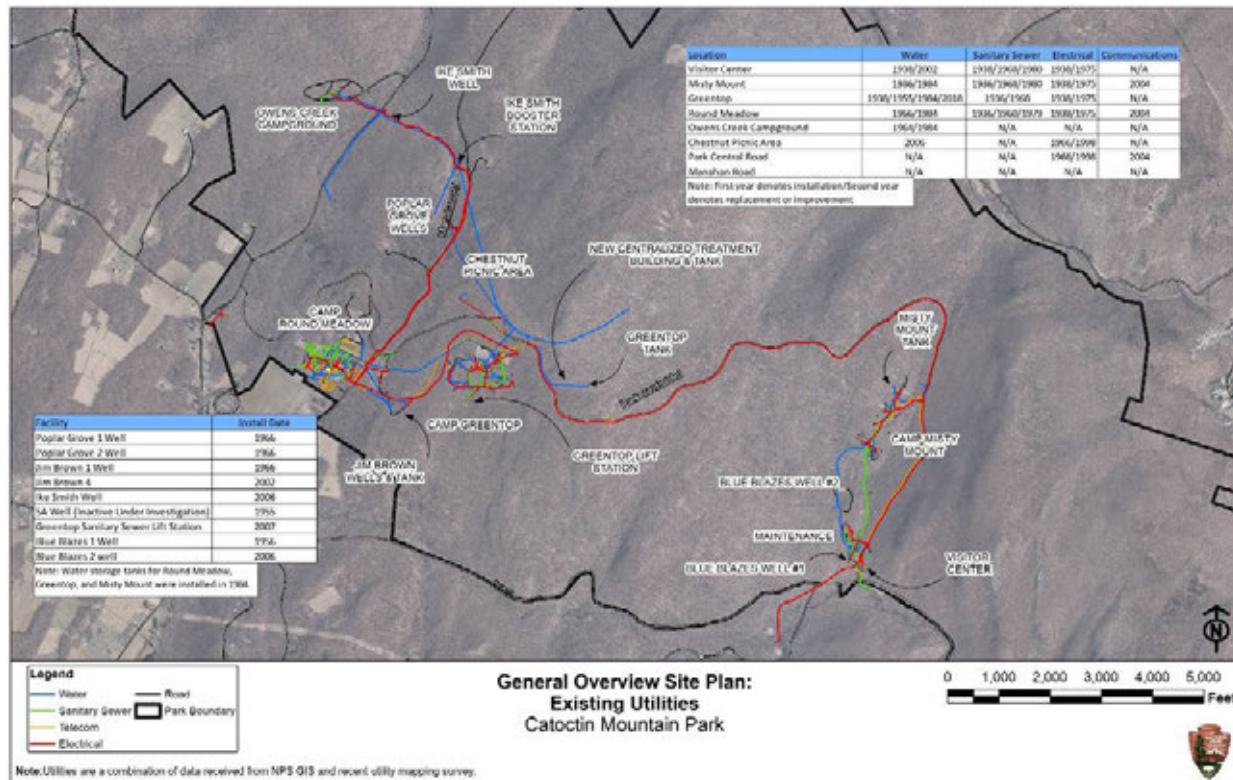


Figure 1: Project Location

ISSUES AND IMPACT TOPICS RETAINED FOR ANALYSIS

This section describes project issues or concerns identified during scoping that were determined by the project team to warrant a more detailed analysis.

Visitor Use and Experience – During implementation of the proposed infrastructure replacement project, areas where the construction would be occurring would be closed to Park visitors. As a result, Park visitors could be forced to find different locations to recreate or be bothered by the noise associated with installation of these new utilities. These impacts would be temporary and occur at different locations at different times. Once these improvements have been made, the impacted areas would be restored to their original or mostly original condition.

Vegetation, Wildlife, and Other Special Concern Species - The majority of actions associated with this infrastructure replacement project would take place in areas that are currently developed, in areas that have been previously disturbed, within structures, or attached to structures in a non-conspicuous manner. As a result, the impacts to vegetation and wildlife in these areas would be minimal. The majority of new impacts to vegetation and wildlife habitat would be focused on those areas where new trenching for new utility lines in previously undisturbed areas would occur or in those utility corridors where vegetation has re-established itself. In these areas, trees and other vegetation would be removed and open trenching would occur. The total sum acreage of land disturbance is approximately 14.36 acres, which includes disturbance of turf in open areas. Impacts to wildlife would be some loss of roosting and nesting area, temporary displacement, disruption from construction equipment, and localized impediments to wildlife movement. The removal of trees could cause an increase of edge habitat, thereby benefitting wildlife species that prefer edge, and possibly decreasing other wildlife species that prefer forest interior habitat.

Historic Districts, Cultural Landscapes, and Archeological Resources

This project would occur within the boundaries of three overlapping historic districts/cultural landscapes. Proposed actions within these historic settings include the installation of a new treatment development,



the removal of trees and vegetation, and the minor modification and/or replacement of above-ground utilities. To mitigate impacts to the historic setting, the designs associated with these actions are intended to blend in with the surrounding landscape. The project also proposes to make changes to five buildings that are contributing to the historic district/cultural landscape: the rehabilitation of one historic well house; the abandonment of one booster station and one historic well house; and the installation of fiber optic cables through the visitor center and gymnasium. The rehabilitation work is carefully considered to minimize visual changes to the character-defining features of the well house. The abandonment of the well houses is temporary, and the structures will be prepared in alignment with federal guidelines for mothballing historic structures. The routing of fiber optic cable through the visitor center and gymnasium will be completed in a way that limits visual impacts to the exterior of the buildings.

This project also involves ground-penetrating activities that may impact archeological resources. In preparation for actions described in this planning document, Secretary of the Interior-Qualified Archeologists completed a *Phase I Archeological Survey* and *Addendum Phase I Archeological Survey* of the Project Area to identify potential impacts to archeological resources. The authors of this survey, Jacobs Engineering Group, recommended that this project would have no noticeable impact on archeological resources and that no further survey is required.

IMPACT TOPICS DISMISSED FROM FURTHER ANALYSIS

This section provides brief descriptions of issues and concerns identified during scoping that were determined to not warrant further consideration, as well as a brief justification for the dismissal of each issue.

Wetlands and Water Resources – Executive Order 11990, “Protection of Wetlands,” and NPS DO #77-1: Wetland Protection defines the NPS goal to maintain and preserve wetland areas. During the initial planning of this infrastructure replacement project, a full wetland delineation was completed within the entire extent of the existing limits of disturbance (see Appendix A). This was done in order to plan alignments that avoided or minimized impacts to the wetlands found within or adjacent to the limits of disturbance. The delineation report also noted several areas where the utility alignment crossed streams. In total, all but one palustrine, forested wetland (PFO) was avoided or utilized pipe-splitting technologies that avoided ground disturbance. The total area of impacted wetlands is approximately .054 acres. The delineation also mapped nine locations where the alignment of the existing utilities would be replaced intersected either perennial, ephemeral, or intermittent streams. Due to the rocky nature of the soils in these locations it was determined that directional boring would not be possible and open trench method would be required. The sum total area of all nine of these crossings total approximately .044 acres. After the replacement of infrastructure is complete, both the PFO wetland and the nine stream crossings would be restored to their original elevation and contours and replanted with an appropriate NPS approved wetland seed mix.

DO 77-1 states that this is an excepted action under 4.2.2.5 (Minor stream crossings for underground utility lines, including electrical lines, telecommunications cables, or water, sewer, gas, or other pipelines), if the cumulative wetland disturbance (stream channel plus non-riverine wetlands immediately adjacent to the channel) totals 0.1 acre or less. This exception requires that: 1) directional drilling under the stream channel and adjacent wetlands has been evaluated during the NEPA process and determined not to be practicable; 2) restoration of pre-construction contours and elevations, soil/substrate characteristics, and wetland/riparian vegetation is accomplished as part of the project; 3) the project would not result in adverse impacts on surface or ground water hydrology (e.g., no wetland drainage); and 4) best management practices for protection of aquatic life (e.g., siltation controls, measures to protect fish migration and spawning) are implemented throughout the construction and restoration processes.

The sum total of impacts to both the PFO wetland and the stream crossings is approximately .098 acres, which falls shy of the DO 77-1 threshold of 0.1 acres. However, within the National Park Service Procedural Manual #77-1: Wetland Protection, acreage limits in the excepted actions below apply to



“single and complete projects.” Single and complete projects are located on discrete sites and have “independent utility” (i.e., are fully functional units by themselves). As such, many of the alignments impacting the one PFO wetland and the stream crossings are completely separate systems and could be installed independently of the others. In this case, the 0.1-acre threshold in exception #2 may be applied separately at each of these independent systems because each could be considered a single and complete project. Regardless of whether the sum total impacts are considered or whether each is considered a single and complete project, the .10-acre is not met, and a Statement of Findings is not required. Lastly, due to the relatively small area of wetlands being impacted and the fact that these areas would be restored after installation of the underground utilities is complete, impacts to wetlands and water resources were dismissed from further consideration. Impacts from vegetation removal and temporary habitat loss would be discussed in the impacts analysis for Vegetation and Wildlife.

Federally Listed Threatened and Endangered Species -

The project area contains potential habitat for the endangered Indiana bat (*Myotis sodalis*) and the threatened northern long-eared bat (*Myotis septentrionalis*). Although both species have been identified within the Park, neither has been identified within the project area. Bat habitat could be impacted by the removal of trees; however, no roost or maternity trees are known to occur within the project area. The project team initiated consultation under Section 7(a)(c) of the Endangered Species Act with the U.S. Fish and Wildlife Service (USFWS) by receiving an official species list for the project area on February 8, 2021. The USFWS responded on February 8, 2021, stating that Indiana bat and northern long-eared bat critical habitat is not known to occur in the project area. An informal consultation letter was sent by the park to USFWS on March 15, 2021. On April 14, 2021, USFWS concurred that because tree removal would not be conducted during the northern long-eared bat pup season (time of year restriction: June 1 to July 31) or within 0.25 mile of a known hibernation site, the project is not likely to have an adverse effect.

State Listed Threatened and Endangered Species – There are a total of 15 special status species (SSS) with potential to occur in the project area. Pedestrian surveys were conducted May 4 through May 6, 2021 to identify any SSS within the limit of disturbance to identify mitigations prior to implementation of the Preferred Alternative. The survey extended 25 feet around all proposed utility alignments, construction areas, and staging areas. During surveys, 158 plant species were documented within or adjacent to the survey area, including 34 non-native species. Four SSS were documented in the project area. The project design team was able to modify the design to avoid the species occurrences except for the bashful bulrush along Park Central Road. Because these avoided occurrences are adjacent to the modified LOD, they will be marked with flagging and designated as no disturbance areas during project construction. The bashful bulrush would have less than 1% of their population impacted during this project. The Maryland Department of Natural Resources Natural Heritage Botanist was consulted on May 24, 2021 and verbally concurred that the small amount that would be disturbed would not negatively impact the population.



ALTERNATIVES

This EA documents the analysis of environmental consequences of two alternatives: the no-action alternative and the proposed action/preferred alternative. The elements of these alternatives are described in detail in this chapter. Impacts associated with the actions proposed under each alternative are outlined in the “Affected Environment and Environmental Consequences” section of the EA.

ALTERNATIVE 1 – NO ACTION – Under the no action alternative, the Park would continue to operate under its current conditions and there would be no comprehensive large-scale replacement of its critical infrastructure. The Park would continue to maintain and repair its current systems until the point replacement is required. There would be no comprehensive approach to dealing with the repair/rehabilitation/replacement of the Park overall aging infrastructure.

ALTERNATIVE 2 – REPLACEMENT OF CRITICAL INFRASTRUCTURE (NPS PREFERRED) -

Alternative 2 takes a comprehensive approach at replacing and upgrading much needed infrastructure within the park. The majority of this work would be conducted in already developed areas, along roadways, or in areas that have been previously disturbed. Overall, the project would consist of the following (see Figure 2):

- Consolidation of the water distribution and storage system into a centralized location near Camp Greentop for Camp Greentop, Camp Round Meadow, and Camp Misty Mount.
- Jim Brown and Poplar Grove wells (four total) would be rehabilitated and would supply raw water to a common chemical treatment location and water storage tank. Jim Brown Well House No. 1 and Poplar Grove Well House No. 1 would be rehabilitated.
- Owens Creek Campground would be maintained as a stand-alone system supplied by the repaired Ike Smith Well House.
- Primary water mains would be replaced for Camp Misty Mount and Camp Round Meadow.
- Primary sewer mains would be replaced at Camp Misty Mount, Camp Round Meadow, and Camp Greentop.
- Rehabilitation of the Camp Greentop lift station and replacement of the lift station at Camp Round Meadow.
- Primary site electrical replacement for Camp Misty Mount, Camp Round Meadow, and Camp Greentop, including transformer replacement, as applicable.
- Fiber-optic backbone installation on the west side of the Park from Camp Round Meadow gym to the new centralized treatment building location, with hardwire nodes to connect the treatment facilities (well houses, lift station, centralized treatment building, water storage tank).
- Fiber-optic installation on the east side of the Park from the Centralized Treatment Building to the Visitor Center.
- Safely decommission the existing Camp Misty Mount, Camp Greentop, and Camp Round Meadow water tanks.
- Abandon in place Ike Smith Booster Station, Blue Blazes Well House No. 1, and Blue Blazes Well House No. 2.
- Two new structures would be constructed near Camp Greentop, about 350 feet from the existing Camp Greentop water tank. The structures include a centralized treatment building with an approximate area of 593 square feet, and a 60,000-gallon water tank with an approximate area of 1,494 square feet. Land disturbance would extend 20 feet from each side of the structure.



- Overall, approximately 75 utility structures are included in the site design, consisting of sanitary sewer manholes, air valves, water meters, sewer, meters, electrical meters, fire hydrants, fiber-optic splice re relief valves, and staging areas.

The project would require trenching approximately 37,000 linear feet for the replacement of existing or adding new infrastructure. Approximately 1,100 linear feet of trenching would take place in areas that have not previously been disturbed. Table 1 provides specific areas where trenching would occur and what type of infrastructure would be placed within that corridor.

Table 1 – Trenching Impacts

Area	Type	LF	Notes
Camp Misty Mount	Shared utility corridor (water, sewer, fiber) 26-ft wide Utility Corridor	1650	Previously disturbed. Open trench. Following existing sewer line or existing gravel road. 1 stream crossing.
	Shared utility corridor (water, sewer, fiber) 26-ft wide Utility Corridor	750	Undisturbed area. Open trench. 2 stream crossings.
	Finished water mains	1650	Open trench. Previously disturbed.
	Water service laterals	800	In-kind. Open trench.
	Sewer mains	2200	Open trench. Mix of in-kind replacement and new alignments but all in previously disturbed areas.
	Sewer laterals	675	In-kind. Open trench.
	Electrical	0	In-conduit. Only replacing wiring. No disturbance.
	Sewer from end of the shared Utility Corridor to Visitor Center	530	Previously disturbed. Open trench.
	Finished water from end of the shared Utility Corridor to Visitor Center. Fiber would share same trench as finished water to Visitor Center.	575	Previously disturbed. Open trench.
Greentop	Finished Water	46	Connecting to a new fire hydrant. Previously disturbed. Open trench.
	Sewer mains	2650	Previously disturbed. Open trench.
	Sewer laterals	1000	Previously disturbed. Open trench.
	Electrical	900	Previously disturbed. Open trench.
Round Meadow	Finished water	2520	Previously disturbed. Open trench.
	Service laterals	686	Previously disturbed. Open trench.
	Sewer mains	2805	Previously disturbed. Open trench.
	Sewer laterals	1034	Previously disturbed. Open trench.
Owens Creek	Finished water from Ike Smith Well House to Owens Creek Campground loop road	655	Pipe bursting crossing underneath Foxville Road and Owens Creek.
	Finished water main within camp	750	Open trench. In-kind. Previously Disturbed.
Park Central Rd	6-inch finished water from the reducer (8" to 6") to Camp Round Meadow	3000	Previously Disturbed Trenching



Parkwide Utility Infrastructure Replacement at Catoctin Mountain Park

Area	Type	LF	Notes
	8-inch finished water from Water Treatment Bldg. to reducer at Park Central Rd. servicing Camp Round Meadow	2150	Previously Disturbed Trenching
	2-inch water main. Finished Water to Chestnut Picnic Area	580	Previously Disturbed Trenching
	8-inch finished water from Water Treatment Bldg. to Camp Greentop existing water connection at Park Central Rd.	1600	Previously Disturbed Trenching
	8-inch finished water from Treatment Bldg. to Misty Mount driveway and parking lot reducer through Park Central Road	11600	Previously Disturbed Trenching. 1 stream crossing
Manahan Road	Fiber from Park Central Road to Poplar Grove Well House through Manahan Road. Electrical would be replacing only wiring in existing conduit.	3550	Previously Disturbed Trenching
	Raw water line from Poplar Grove well house to connection near Well 5A, crossing Manahan Road	2350	Pipe Bursting. Minimal Open Trench for 6 pits (approx. every 500 ft).
Jim Brown Well House to Park Central Road	Raw Water line from Jim Brown well house to shared corridor at Park Central Road)	1400	Existing utility corridor. Previously disturbed. Open trench.

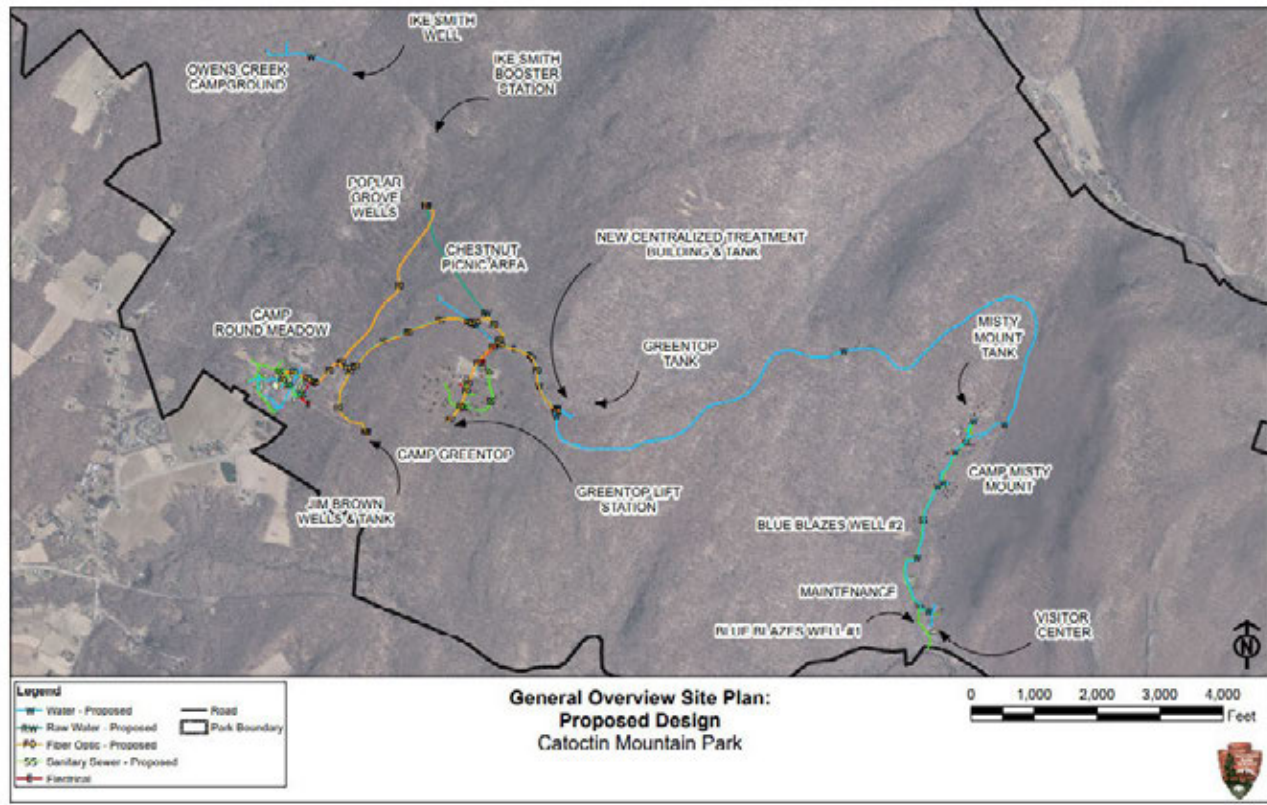


Figure 2: General Overview Site Plan

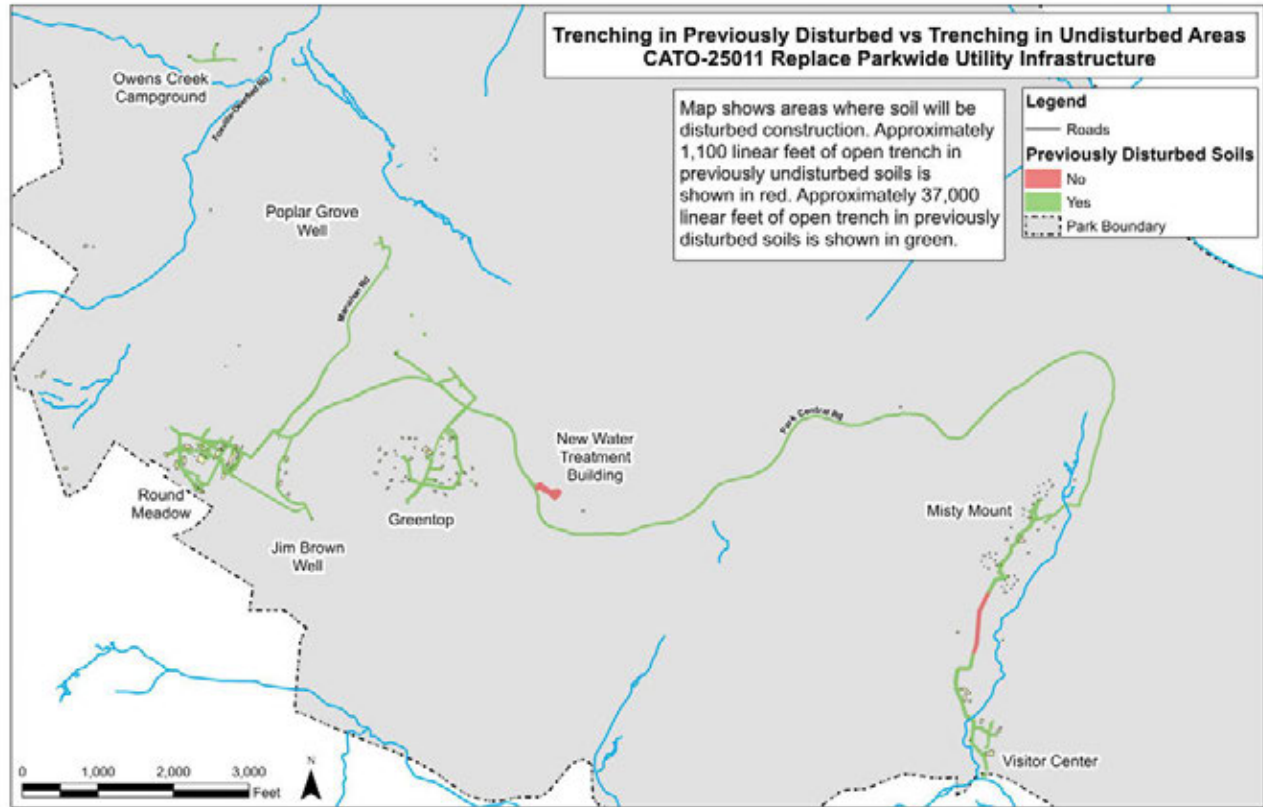


Figure 3: Areas to be Trenched



AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes current environmental conditions in and surrounding the project area. These conditions serve as a baseline for understanding the resources that could be impacted by implementing the project. In addition, this chapter would include an analysis of the environmental consequences of each alternative.

VISITOR USE AND EXPERIENCE

The most common activities for visitors at the Park included ranger-led programs, hiking, camping, rock climbing/rappelling, picnicking, wildlife viewing, viewing fall foliage, cross-country skiing, horseback riding, and fishing. The visitor center, located at the entrance to the park, next to the Blue Blues Parking Lot provides exhibits about past area industries, the development of the park, and local wildlife. Visitors interested in camping can select from three locations within the park: Owens Creek Campground, Poplar Grove Campground (open to youth groups only) or Adirondack shelters. Lodging also is available within the park at Camp Greentop, Camp Misty Mount, and Camp Round Meadow. All of the camping and lodging facilities are within the project area.

Access to the park is available through a combination of major highways, state routes, and local roads using private vehicles. Depending on the visitor's point of origin, I-495, I-695, I-270, I-70, and I-81 provide access to the vicinity of the park. The park is accessed from the east directly from State Route 77, which is accessible from U.S. Routes 15, and from the west from State Road 64. Once within the park boundaries, points of interest are accessed using Park Central Road, which extends from the park entrance, local roads (Manahan Road and Foxville Deerfield Road), and existing trails. Park Central Road provides two-way traffic and is the primary access road within the Park.

Visitors to the Park are subject to the current conditions of the Park's 40-80-year-old unreliable infrastructure. Visitors experience potable water not meeting current EPA standards, unreliable cell phone service, comfort stations and sanitary sewers systems coming to an end of their useful lives and aging electrical systems within the Park's camps and buildings. All of these deficiencies require constant maintenance and upkeep from Park staff just to keep these systems functioning.

One of the purposes of this project is to correct these infrastructure deficiencies in order to provide park visitors an opportunity to enjoy the resources of the park without being distracted by the Park's aging and unreliable infrastructure. Implementation of the all the infrastructure replacement actions proposed under the Preferred Alternative would take approximately two to four years to complete. During these two to four years certain trails, camps, and structures would need to be closed to the public as different segments take place. Apart from the visitor's disappointment of having closed trails and camps, there would also be constant construction happening at someplace in the Park for those two to four years. This constant construction would result in increased noise, presence of construction equipment, increased truck traffic on interior roads, and the removal of vegetation, all of which would diminish the overall use and experience of the Park visitor. The Park would minimize this impact by sequencing construction based on park off season to the extent practicable to minimize impact to visitors and use of campgrounds. In addition, water to the Park would continue to be supplied by existing groundwater wells and chemical treatment and would not result in water outage during construction. Lastly, a traffic control plan would be implemented when installing pipe across Park Central Road, Manahan Road, and shoulder work along roads to minimize congestion and keep the roads open to the public.

After the two to four years, when construction and restoration of the construction areas is complete, there would be mostly beneficial impacts on visitor experience from the overall improved reliability of Park's new systems, such as improved potable water; better wireless communications; more reliable electrical systems; and upgraded sanitary sewer systems. There would be some corridors along some of the roadways where there would be a lot fewer trees, which would likely be noticeable to those regular visitors. However, those areas would revegetate and the scars from the construction would fade over time.



VEGETATION AND WILDLIFE AND SPECIAL STATUS SPECIES

Currently, approximately 90 percent of the Park is covered with forest. Most of the park contains a mixture of oaks, hickories, maple, and tulip poplar. Japanese barberry was by far the most dominant understory species throughout the upland areas and is an invasive species found throughout the uplands of the entire park. Other types of trees that can be found in the park include cherry, ash, sassafras, elm, butternut, locust, walnut, hemlock, and white pine. There is no agricultural land use within the park. There are a total of 50 state listed Special-Status Species in the park, 5 listed as State Threatened, and 3 listed as State Endangered. There are a total of 15 special status species (SSS) with potential to occur in the project area. Pedestrian surveys were conducted May 4 through May 6, 2021 to identify any SSS within the limit of disturbance to identify mitigations prior to implementation of the Preferred Alternative. The survey extended 25 feet around all proposed utility alignments, construction areas, and staging areas. During surveys, 158 plant species were documented within or adjacent to the survey area, including 34 non-native species. Four SSS were documented in the project area. The project design team was able to modify the design to avoid the species occurrences except for the bashful bulrush along Park Central Road. Because these avoided occurrences are adjacent to the modified LOD, they will be marked with flagging and designated as no disturbance areas during project construction. The bashful bulrush would have less than 1% of their population impacted during this project and the Maryland Natural Heritage botanist concurred that the small amount that would be disturbed would not negatively impact the population.

The Park's forested ecosystem is habitat for more than 280 species of animals (excluding invertebrates), most of which are resident and migratory birds. Common wildlife that are found in the park include squirrels, chipmunks, mice, pileated woodpeckers, wild turkeys, brook trout, bats, wood frogs, and eastern box turtles. Mammals found in the park, in addition to white-tailed deer, include striped skunks, woodchucks, squirrels, chipmunks, several species of mice, eastern cottontail rabbits, opossums, raccoons, red foxes, gray foxes, coyotes, bobcats, beavers, mink, and black bears. Nine species of bats occur in the park including: the big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*), eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), and five White-nose Syndrome (WNS) species of interest, the eastern small-footed bat (*Myotis leibii*), northern long-eared bat (*Myotis septentrionalis*), Indiana bat (*Myotis sodalis*), tri-colored bat (*Perimyotis subflavus*), and little brown bat (*Myotis lucifugus*). Approximately 170 species of birds occur in the park during some part of the year, including great horned owls, wild turkeys, hawks, woodpeckers, and a variety of songbirds such as crows, warblers, sparrows, and finches.

The majority of impacts to vegetation and wildlife would take place in the area where trenching would occur, which would require the removal of trees and other vegetation along the entire length of the trench alignment, the total sum acreage of this land disturbance is approximately 14.36 acres, which includes disturbance of turf in open areas. There would be less than 15 acres of tree clearing. Areas where tree removal would be focused include Park Central Road shoulder, new utility corridor between Camp Misty Mount and Visitors Center, new centralized chemical treatment and water tank location and clearing/vegetation maintenance within existing utility/road right-of-way. Tree removal would be limited to the minimum number necessary to accomplish the project. Tree removal would not be conducted during the northern long-eared bat and Indiana Bat pup season (June 1 to July 31) or within a ¼ mile of a hibernation site. In order to avoid bird nesting season, tree removal would not occur between May 1 and August 31 (USFWS BCC Probability of Presence Survey).

Clearing and trenching these areas would also displace any resident wildlife species found within and adjacent to the trench alignment. Vegetation removal and construction activities could result in direct mortality of less mobile terrestrial species and ground nesting birds. The trench alignment may also serve as an obstruction for less mobile species such as invertebrates, small mammals, reptiles, and amphibians moving through the area. Vegetation removal within the project area would also create edge habitat along the adjacent woodlands, which would expose formerly interior dwelling vegetation along the edge to a



different climate and more sun exposure. These changes could change the composition of vegetation along the new edge, ultimately altering the habitat and affecting the wildlife species that use the habitat. Lastly, the presence and noise associated with people and construction equipment operating in the area would displace wildlife species in the immediate vicinity. The extent of these impacts would not likely be great since there is abundant similar habitat where these displaced wildlife species could go.

After construction, all materials would be removed from the construction area limit and the site would be prepared for revegetation. The areas would be restored using native vegetation and would be monitored and managed to prevent colonization by invasive species. Utility corridors would be maintained with native herbaceous species in order to prevent tree growth to protect new utilities from root damage. Wildlife would begin to use the area after construction activities are complete and the area replanted with vegetation.

HISTORIC RESOURCES

This project would occur within the boundaries of three overlapping historic districts: Catoctin Mountain Park Historic District, Camp Misty Mount Historic District, and Camp Greentop Historic District. Catoctin Mountain Park was listed on the National Register of Historic Places in 2014. Camp Greentop and Camp Misty Mount were listed in 1989 as part of a Multiple Property Documentation Submission for Emergency Conservation Work Architecture at Catoctin Mountain Park. The NPS manages each district as a cultural landscape, with SHPO-concurred Cultural Landscape Inventories (CLI) completed for Catoctin Mountain Park and Camp Misty Mount in 2004 and Camp Greentop in 2016. The no action alternative will not change the physical appearance of the historic districts/cultural landscapes. For an evaluation of impacts associated with the Preferred Alternative, please refer to the text below.

Catoctin Mountain Park Historic District/Cultural Landscape - The land that is now Catoctin Mountain Park has been used by humans for thousands of years. The earliest record of human activity dates to the Late Archaic Period (3,000 BCE). The land was settled by European farmers in the mid-eighteenth century, and continued to develop through the nineteenth and early twentieth centuries. Catoctin Recreational Demonstration Area (RDA) was established in 1936 as a NPS property intended to provide recreational opportunities close to metropolitan areas. In 1942, a portion of the RDA was set aside for use by the Office of Strategic Services (precursor to the Central Intelligence Agency) for training purposes. During World War II, President Franklin Delano Roosevelt initiated plans to reserve one section of the RDA as a presidential retreat. In 1954, the RDA was re-named Catoctin Mountain Park.

Catoctin Mountain Park is eligible for the National Register under Criteria A, B, C, and D in the areas of Architecture, Archeology, Recreation, Industry, and Military. Its period of significance runs from 3,000 BCE to 1954 CE. For those resources specific to Camp David, it has a second period of significance which runs from 1952 to 1978. At the time the nomination was prepared, park resources associated with Mission 66 and Job Corps were not evaluated for National Register eligibility. In 2022, the park will update the existing nomination to evaluate Mission 66- and Job Corps-related resources. At present, resources associated with the Job Corps and Mission 66 are managed by the NPS as contributing resources to the historic district.

In association with the overarching historic setting of Catoctin Mountain Park Historic District/Cultural Landscape, the Preferred Alternative proposes to install a new centralized treatment facility just north of Park Central Road in the approximate center of the park; remove approximately 962 trees throughout the park; and make minor modifications to aboveground utilities. Overall, these project elements were designed to mitigate potential impacts to historic resources and blend in with the surrounding landscape. The centralized treatment facility would be painted carriage brown to blend in with the surrounding landscape. During winter months, the driveway, treatment building, and water tank would all likely be visible from Park Central Road due to the lack of leaves on trees. During the spring, summer, and fall, only portions of the development would likely be visible from the road due to screening associated with the trees. In preparation for this project, Jacobs Engineering Group surveyed 4,127 trees within the



project area. Of these, 962 trees were identified as trees that would be compromised by the construction project. The project team carefully designed the utility corridors to limit the number of trees to be removed by narrowing the corridor as much as possible; creating a zig-zagged route to avoid straight, cleared paths through forested landscape; and aligning corridors with existing roads and pedestrian trails. Furthermore, the project team developed a planting plan of native shrubs to mitigate the impact of open spaces in the cabin camp areas and in front of the new centralized treatment facility. Overall, the tree removal portion of this project will not significantly impact the historic feeling and setting of the dense deciduous forest that characterizes Catoctin Mountain Park. Modifications to existing utilities throughout the park and were designed with the intention of mitigating visual impacts to the landscape.

The Preferred Alternative also involves making modifications to five historic buildings within the Catoctin Mountain Park Historic District/Cultural Landscape. The Ike Smith Pumphouse (1938) was constructed by the Catoctin RDA as a pumphouse and is identified in the National Register nomination for Catoctin Mountain Park as contributing. The other four are managed by the NPS as contributing to the Catoctin Mountain Park Historic District. The Blue Blazes Well House No. 1 (1966), Jim Brown Well House No. 1 (1965), and the Gymnasium (1968-1969) at Camp Round Meadow were constructed by the Job Corps. The Catoctin Mountain Park Visitor Center (1941) was constructed by the Catoctin RDA as the "Blue Blazes Visitor Contact Station." In 1965, eleven years after the park unit was re-named Catoctin Mountain Park, the NPS re-modeled the building to expand the headquarters in alignment with NPS Mission 66 initiatives.

This alternative proposes to rehabilitate Jim Brown Well House No. 1 by replacing the existing mono-sloped, rolled asphalt roof and 15' sq skylight with a new, removable, mono-sloped, standing-seam metal roof. The currently vinyl fascia would be replaced with wood. This project also includes the in-kind replacement of the exterior door, frame, and hardware with heavy-duty hollow metal door and stainless-steel frame, matching the existing in measurements and finish. This project also includes the replacement of equipment on the interior of the building, including piping, heating, and well components. The change in roofing material from rolled asphalt to standing seam metal would not be visible from the ground level and would therefore not compromise the integrity of the mid-century building.

In association with the centralization of the park's utilities, the park proposes to temporarily discontinue using the Blue Blazes Well House and the Ike Smith Pumphouse as part of its utility system. The park intends on mothballing the buildings in alignment with NPS Preservation Brief #31: Mothballing Historic Buildings until deciding for its future use.

This alternative also proposes to install fiber optic cable in the Catoctin Mountain Park Visitor Center and Gymnasium at Camp Round Meadow. On both buildings, the fiber optic cable will be affixed to a small, screened portions of the exterior in areas with existing utilities. On the interior, the cable will run alongside existing utilities.

The remainder of historic resources within the district are indirectly impacted by the project, with temporary visual effects, such as trenching, and minor visual effects, such as the in-kind replacement of aboveground utility structures, such as fire hydrants. In certain locations, the project area appears to intersect contributing features, such as the Saw Mill Race in the Owen's Creek Campground Area and the Stone Wall and Headwalls near the Visitor Center. In both instances, underground utilities would be replaced via pipe-splitting methods to avoid significant impacts to historic resources.

Camp Misty Mount Historic District/Cultural Landscape - Camp Misty Mount was constructed in the late 1930s by the Works Progress Administration (WPA) as a cabin camp for use by a wide range of organizations and members of the public. Camp Misty Mount is eligible for listing in the National Register at the state and local levels under Criteria A and C in the areas of Architecture, Conservation, and Entertainment/Recreation for its associations with the RDA and for its examples of rustic architecture. The period of significance runs from 1935, when the RDA was first developed, to 1938 to encompass the construction of all associated WPA-era buildings in the camp.



The Preferred Alternative proposes to demolish (either in full, or partially) one non-historic 30,000-gallon, FRP water storage tank at Camp Misty Mount that is buried beneath a large mound of earth, which would be beneficial to removing non-historic elements to the historic landscape. This project proposes to abandon existing water lines, install a new water supply line, install new fiber optic communication lines, replace water service laterals, and replace sanitary sewer laterals. These actions would not change the appearance of the property. Tree removal proposed within the boundaries of Camp Misty Mount was carefully designed to limit the number of trees to be removed by narrowing the corridor as much as possible; creating a zig-zagged route to avoid straight, cleared paths through forested landscapes; and aligning corridors with existing roads and pedestrian trails. Furthermore, the project team developed a planting plan of native shrubs to mitigate the impact of open spaces in Camp Misty Mount. Overall, the tree removal portion of this project will not significantly greatly impact the historic feeling and setting of the dense deciduous forest that characterizes Camp Misty Mount.

Camp Greentop Historic District/Cultural Landscape - Camp Greentop was constructed in the late 1930s by the WPA as a cabin camp for use by the Maryland League for Crippled Children. The NPS made improvements to the camp during the Mission 66 period, which included the construction of a centralized, mid-century dining hall/recreation hall. Camp Greentop is eligible for listing in the National Register at the state and local levels under Criteria A and C in the areas of Architecture, Conservation, and Entertainment/Recreation for its associations with the RDA and for its examples of rustic architecture. The period of significance runs from 1935, when the RDA was first developed, to 1938 to encompass the construction of all associated WPA-era buildings in the camp. At the time the nomination was completed, resources associated with the Mission 66 era had not reached its 50-year threshold. In 2022, the park plans to update the nomination for Catoctin Mountain Park, which encompasses Camp Greentop, to encompass these mid-century resources. Until then, the park is managing Mission 66 era resources as if they are contributing.

The Preferred Alternative proposes to rehabilitate an existing sanitary lift station at the southernmost edge of the property. The sanitary lift station is located well out of view of the contributing features of the landscape. The rehabilitation work is largely in-kind and would not significantly alter the appearance of the existing station. This project also includes the replacement of existing underground sanitary sewer and electrical lines, which would not change the appearance of the historic landscape. The park proposes to install a new fire hydrant just west of the existing, non-historic horse barn, and just east of the contributing landscape feature, Playfield and Pasture, along the contributing Main Gravel Loop Road. Although within view of mid-century resources managed as contributing, such as the Dining Hall/Recreation Hall and the Greentop Stable Office, the installation of a new fire hydrant would not detract from the qualities that make these potentially contributing to the historic district. Tree removal proposed within the boundaries of Camp Greentop was carefully designed to limit the number of trees to be removed by narrowing the corridor as much as possible; creating a zig-zagged route to avoid straight, cleared paths through forested landscapes; and aligning corridors with existing roads and pedestrian trails. Furthermore, the project team developed a planting plan of native shrubs to mitigate the impact of open spaces in Camp Greentop. Overall, the tree removal portion of this project will not significantly greatly impact the historic feeling and setting of the dense deciduous forest that characterizes Camp Greentop.

Archeological Resources - This project involves ground-disturbing activities in association with the installation and replacement of utilities. Prior to planning for this project, the NPS oversaw a total of 6 archeological surveys within the project area; these previous surveys identified a total of 21 sites. In an effort to avoid impacts to archeological resources in association with the Preferred Alternative a Phase I Archeological Survey was conducted in October and December 2020. The survey area consisted of 6.5-mile-long utility corridor; a 20ft x 20ft radius for all manhole, air vent, geotechnical drilling, and subsurface evaluation hole locations; and a 40ft x 40ft radius for any proposed lift stations. The total area for the Phase I Archeological Survey measures 15.87 acres. As a result of the Phase I Archeological Survey, two new archeological sites were identified. One site was recommended as ineligible for listing on the NRHP under Criterion D, and the other site will be avoided by the project. Additionally, the 21



previously inventoried sites that intersect or are within 100ft of the project area were investigated. Fifteen of the previously inventoried archeological sites are not within the project and therefore will not be impacted. The remaining six previously inventoried archeological sites exhibit prior disturbance within the project and were either not reidentified within the project corridor or did not appear to be eligible for NRHP-listing under Criterion D. In June 2021, Jacobs Engineering Group conducted an additional archeological survey to review areas not previously covered in the October and December 2020 surveys. The Addendum to the Phase I Archeological Survey measures 2.09 acres and investigated two previously inventoried archeological sites. One of the previously inventoried archeological sites, one was not reidentified within the project corridor, the remaining site was reidentified approximately 100ft south of the previously recorded location. Therefore, the two archeological sites will not be impacted by the project. As a result, it was recommended that this project would have no impact on archeological resources, and no further archeological survey is required.



AGENCY SCOPING

During the preparation of the planning associated with this project, the following agencies were consulted:

Maryland Historic Trust – Section 106 of the National Historic Preservation Act (54 USC § 306101) and its implementing regulations (36 CFR Part 800) require federal agencies to take into consideration the effects projects have on historic properties. In alignment with Section 106 and the *Programmatic Agreement Among the National Park Service, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers with Compliance for Section 106 of the National Historic Preservation Act* (2008), the park initiated formal consultation with the Maryland Historic Trust, the State Historic Preservation Office (SHPO) on December 18, 2020. The park submitted a formal cover letter, the schematic design drawings dating to July of 2020, the draft archeological survey report in December 2020, photographs of the project area, maps identifying the Project Area and Area of Potential Effect, and a list of potentially impacted resources, but no effects assessment. SHPO responded to the park on February 2, 2021. As of the writing of this EA, Section 106 consultation with the SHPO is on-going. The NPS submitted the Section 106 Assessment of Effects to the SHPO on August 11, August 2021. It is anticipated that the SHPO will concur that this project will have no adverse effect on historic resources in September 2021. The Assessment of Effects, which was submitted to the SHPO for review, is attached to this EA.

Delaware Nation – In alignment with Section 106, the park initiated formal consultation with the Delaware Nation Tribal Historic Preservation Officer (THPO) on February 10, 2021. This initial consultation package included a formal cover letter, the schematic design drawings dating to July of 2020, the draft archeological survey report in December 2020, photographs of the project area, maps identifying the Project Area and Area of Potential Effect, and a list of potentially impacted resources, but no effects assessment. On August 11, 2021, the park submitted Section 106 Assessment of Effects to the Delaware Nation Historic Preservation Office for review.

Seneca-Cayuga Nation – In alignment with Section 106, the park initiated formal consultation with the Seneca-Cayuga Nation THPO on February 10, 2021. This initial consultation package included a formal cover letter, the schematic design drawings dating to July of 2020, the draft archeological survey report in December 2020, photographs of the project area, maps identifying the Project Area and Area of Potential Effect, and a list of potentially impacted resources, but no effects assessment. On August 11, 2021, the park submitted Section 106 Assessment of Effects to the Seneca-Cayuga Nation Historic Preservation Office for review.

Tuscarora Nation – In alignment with Section 106, the park initiated formal consultation with the Tuscarora Nation THPO on February 10, 2021. This initial consultation package included a formal cover letter, the schematic design drawings dating to July of 2020, the draft archeological survey report in December 2020, photographs of the project area, maps identifying the Project Area and Area of Potential Effect, and a list of potentially impacted resources, but no effects assessment. On August 11, 2021, the park submitted Section 106 Assessment of Effects to the Tuscarora Nation Historic Preservation Office for review.

Maryland Department of Natural Resources – Park staff consulted with the Maryland Forest Service Western Region Coordinator for Urban and Community Forestry on March 10, 2021. It was determined that a Forest Conservation Plan is not required because land disturbance will be less than 40,000 square feet and forest clearing will be less than 20,000 square feet. The Maryland Roadside Tree Law does not apply because there is no work occurring in a right-of-way.

Maryland Department of Environment – Consultation occurred via permitting and erosion/sediment control and stormwater management plan approval. Permits included:



1. General Permit No. 11 – discharges from tanks, pipes, and other containment structures at facilities
2. General Permit No. 14 – discharges of stormwater associated with construction activity
3. Water and Sewage Construction Permit – determined not required after consultation with MDE
4. 401 Water Quality Certification
5. Joint Federal/State Application for the Alteration of Any Floodplain, Waterway, Tidal, or Nontidal Wetland in Maryland

Town of Thurmont – The department of public works was notified of the construction.

Frederick County Department of Health – A well system modification review was performed for well 5A in conjunction with MDE.

U.S. Army Corps of Engineers – Consultation occurred in accordance with Nationwide 3 and Nationwide 12, and reissuance and modification of nationwide permits, including nationwide permits 57 and 58. Nationwide permits are suspended in Maryland due to State Programmatic General Permits.

U.S. Fish and Wildlife Service – Section 7 consultation was initiated on February 8, 2021. The USFWS provided a species list to fulfill section 7(c) of the Endangered Species Act of 1973. Since the endangered Indiana Bat and threatened northern long-eared bat were on the species list but there were no designated critical habitats listed within the project area, the park sent a consultation letter to USFWS on March 15, 2021. On April 14, 2021, USFWS concurred that the federally endangered Indiana bat and federally threatened northern long-eared bat are known to occur in the project vicinity, this project as proposed is not likely to adversely affect the species because tree clearing will occur from September 1 through April 30, which is a time period when both species are hibernating in caves and not using forested habitat.



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APPENDIX A: Preliminary Jurisdictional Waters and Functional Assessment Report



National Park Service

**Replace Parkwide Utility Infrastructure, Catoctin Mountain
Park, Frederick County, Maryland
CATO-250011**

**Preliminary Jurisdictional Waters and Functional
Assessment Report
Final**

May 2021

Prepared by:

Jacobs Engineering Group, Inc.

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Contract No. GS00F0025M

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Acronyms and Abbreviations

Acronym	Definition
AgACIS	Agricultural Applied Climate Information System
CATO	Catoctin Mountain Park
CFR	Code of Federal Regulations
FEMA	Federal Emergency Management Agency
FGDC	Federal Geographic Data Committee
HUC	Hydrologic Unit Code
NHD	National Hydrography Dataset
No.	Number
NOAA	National Oceanic and Atmospheric Association
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRPW	Non-Relatively Permanent Waters
NWI	National Wetlands Inventory
OHWM	ordinary high-water mark
Project	Replace Parkwide Utility Infrastructure, Catoctin Mountain Park Project
RPW	Relatively Permanent Waters
Study	preliminary wetland/jurisdictional waters delineation and functional assessment study
TOB	Top of Bank
TNW	Traditional Navigable Waters
UNT	Unnamed Tributary

Acronyms and Abbreviations

USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WETS	Climate Analysis for Wetlands Tables

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Executive Summary

The National Park Service (NPS) is replacing existing NPS-owned and operated infrastructure systems that range in age from 25 to 80 years old, including potable water, sanitary sewer, electric power, and communications. The Replace Parkwide Utility Infrastructure Project (Project) will correct serious deficiencies that directly affect the natural environment and the health and safety of NPS personnel and visitors at Catoctin Mountain Park. The Project will replace the failing infrastructure with new systems that meet local, state, and national operational standards. The Project will eliminate excessive groundwater infiltration into the aged sewer collection system, assure code compliant discharges, and replace an outdated potable water treatment and distribution system. The communication network will be significantly upgraded, eliminating redundant systems, and linking Parkwide facilities. Additionally, the integrated communication technology will allow facilities management professionals to monitor real-time water flow, treatment, storage, and distribution systems. Unreliable/non-functional cell-based telemetry will be replaced. As part of the design of the Project, a preliminary wetland/jurisdictional waters delineation and functional assessment study (study) was conducted.

During the field study, a total of six wetlands and eleven waterbodies were identified and marked in the field. Out of the six identified wetlands, it was determined that only four are located within the study limits and are identified as potential preliminary jurisdictional wetlands. Of the eleven waterbodies, one was determined to be outside of the study limits, , one was identified as an ephemeral non-jurisdictional roadside ditch, and the remaining nine are identified as potential jurisdictional waterbodies..

The jurisdictional delineation results and conclusions presented in this Report are considered preliminary, pending verification by the U.S. Army Corps of Engineers Regulatory Branch.



Chapter 1 – Introduction

This Preliminary Wetland/Jurisdictional Waters and Functional Assessment Report (Report) presents the findings of the wetland and waters delineation conducted on behalf of the National Park Service (NPS) for the Parkwide Utility Infrastructure Project at Catoctin Mountain Park (hereafter referred to as the Project) in Frederick County, Maryland.

Catoctin Mountain Park is located in north-central Maryland and is within the Blue Ridge Mountain Ecoregion (Ecoregion 66), a region characterized with high local relief and steep channel gradients (Woods et al., 1999) (Figure 1, Ecoregion Project Location).

The purpose of the Project is to replace rapidly deteriorating NPS-owned and operated infrastructure systems that range in age from 25 to 80 years old while protecting cultural and natural resources within the Project site. Specifically, the Project will include the following:

- Consolidation of the water distribution and storage system into a centralized location near Camp Greentop for Camp Greentop, Camp Round Meadow, and Camp Misty Mount.
- Rehabilitation of the Jim Brown and Poplar Grove wells (four total), which will supply raw water to a common chemical treatment location and water storage tank. Jim Brown Well House No.1 and Poplar Grove Well House Number (No.) 1 will be rehabilitated.
- Maintaining Owens Creek Campground as a standalone system supplied by the rehabilitation of the existing Ike Smith Well House.
- Replacement of the primary water mains for Camp Misty Mount and Camp Round Meadow.
- Replacement of the primary sewer mains at Camp Misty Mount, Camp Round Meadow, and Camp Greentop.
- Rehabilitation of the Camp Greentop lift station and replacement of the lift station at Camp Round Meadow.
- Replacement of the primary site electrical for Camp Misty Mount, Camp Round Meadow, and Camp Greentop. Transformers will be replaced, as applicable.
- Installation of fiber-optic backbone on the west side of CATO from the Camp Round Meadow gym to the new centralized treatment building location, with hardwire nodes to connect the treatment facilities (well houses, lift station, centralized treatment building, and water storage tank).
- Safely decommission and partial demolition of the existing Camp Misty Mount and Camp Round Meadow water tanks.



- Abandon in place Ike Smith Booster Station, Blue Blazes Well House No. 1, and Blue Blazes Well House No. 2.

The area surveyed as part of the wetland delineation is known as the “study area” and includes all proposed utility alignments and projected limits of disturbance plus a minimum 25 feet beyond the alignments of limits of disturbance. This additional 25 feet was proposed to address Maryland’s 25-foot wetland buffer requirement for non-tidal wetlands. Please note that non-tidal wetlands of special state concern as defined and designated in the Code of Maryland Regulations 26.23.06 require a 100-foot expanded buffer. Therefore, in areas identified as special state concern wetlands, the study area was extended to 100 feet beyond the limits of disturbance.

Land use within the vicinity of the Project consists of federal lands associated with Catoctin Mountain Park, which consists recreational facilities and features of the Park.



Chapter 2 – Location

The Project is located in Thurmont, Frederick County, Maryland (Figure 2). The study area is located within the U.S. Geological Survey (USGS) 7.5-minute quadrangle (Blue Ridge Summit, Pennsylvania, Maryland [USGS, 2019a]) and within the Chesapeake Bay watershed (Hydrologic Unit Code [HUC] 020700090505) (USGS, 2019b).

The study area can be accessed as follows:

From Hagerstown, Maryland, take Interstate 70 east to Route 66 north for 7 miles and then turn right on Route 64 for 1 mile. Turn right onto Route 77 East at a traffic light. Continue on Route 77 East for approximately 7 miles. Turn left onto Park Central Road and the Visitor Center is on the right.



Chapter 3 – Methods

Wetland/jurisdictional water resources delineation field surveys were conducted on December 14, 2020 through December 16, 2020, and on January 7, 2021 through January 8, 2021. An additional wetland/jurisdictional water resources delineation field survey was completed on May 7, 2021 to account for an updated utility alignment shift. The field survey was limited to the study area (25.11 acres) that consists of the proposed utility infrastructure alignment plus an additional buffer area (Figure 2). The following subsections describe the field sampling procedures and methods used to determine and map wetland and water resources. Site-specific information reviewed during the desktop survey (pre-field investigation), collected during or produced from the field survey, is provided in the appendices.

3.01 Desktop Survey

A desktop review of publicly available data pertaining to climate, vegetation, soils, hydrology, and existing wetlands before the field survey. Data sources included:

- USGS topographic maps (Quadrangle) (USGS, 2019a)
- National Wetlands Inventory (NWI) (U.S. Fish and Wildlife Service [USFWS], 2020) and National Hydrography Dataset (NHD) maps (USGS, 2020)
- Flood Map Service Center (Federal Emergency Management Agency [FEMA], 2021)
- Regional and local precipitation records
- Web Soil Survey (U.S. Department of Agriculture [USDA]-Natural Resources Conservation Service [NRCS], 2021a)

3.02 Field Survey

The field evaluation of the study area to delineate wetland and water resources was performed over 3 separate field efforts. The first field effort initially took place December 14, 2020 through December 16, 2020. Due to inclement weather the survey was completed on January 7, 2021 through January 8, 2021. An additional survey was completed on May 6th, 2021 to account for an updated utility alignment shift.

3.02.1 Method for Delineating Wetlands

The survey method for identifying wetlands followed the *Corps of Engineers Wetlands Delineation Manual* (USACE, 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont* (Version 2.0) (USACE, 2012). This method uses the three-parameter approach which requires the coincidence of three criteria (vegetation, soils, and hydrology) to determine the presence of wetlands.



Within NPS property, any areas classified as a wetland according to the Federal Geographic Data Committee (FGDC) Wetlands Classification Standard are subject to Director's Order #77-1 (NPS, 2002). As such, the survey method for identifying wetlands also followed the *Classification of Wetlands and Deepwater Habitats of the United States* (FGDC, 2013). Under the FGDC Wetlands Classification Standard, a wetland must have one or more of the following three attributes:

1. At least periodically, the land supports predominantly hydrophytes.
2. The substrate is predominantly undrained hydric soil.
3. The substrate is non-soil and is saturated with water or covered by shallow water during the growing season each year.

The FGDC Wetlands Classification Standard encompasses more wetland and aquatic habitat types than the statutory wetland definition (Title 33 of the Code of Federal Regulations [CFR] Part 328.3) and the U.S. Army Corps of Engineers (USACE) Delineation Manual and Regional Supplements, i.e., habitat types where soils and/or vegetation are absent but wetland hydrology is present.

During the field efforts, wetland hydrology was determined from direct observation of soil saturation and inundation or other indicators.

At each sample point, plant species and percent cover was visually estimated and recorded. Dominant plant species are defined as the most abundant species whose cumulative cover accounted for more than 50 percent of the total cover, as well as any one species that accounted for at least 20 percent of the total vegetative cover. Strata that contained less than 5 percent cover were not considered in the dominance test. The wetland indicator status for plant species was determined using the National Wetland Plant List (USACE, 2018). In areas of problematic hydrophytic vegetation, additional analysis of factors affecting the site were employed. To the extent possible, the hydrophytic vegetation decision was based on the plant community that is normally present during the wet portion of the growing season in a normal rainfall year (USACE, 2012).

Soil characterization was determined from direct observation of soils between 0 and 25 inches below ground surface.

Each wetland or waterbody was delineated and recorded using a handheld Trimble GeoXH Global positioning system receiver with submeter accuracy. As features were collected, they were given unique feature identifications (IDs). Streams were labeled, beginning with an 'S' for streams and 'W' for wetlands, followed by the initials of the lead delineator and then a three-digit number identification of the stream/wetland.



3.02.2 Method for Delineating Jurisdictional Boundaries for Other Waters

Within non-tidal waters, in the absence of adjacent wetlands, the extent of USACE jurisdiction is defined by the ordinary high-water mark (OHWM). In 33 CFR 328.3, the OHWM is defined as the “line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, or the presence of litter and debris” (USACE, 1987). Generally, USACE considers the OHWM to be the elevation to which water flows at a 2-year frequency (for example, 50 years out of 100 years). Typically, the OHWM is indicated by the presence of a defined streambed with bank shelving, but may also include flow lines, sediment deposition or scour, and mineral staining, salt deposits, or deep or surficial cracking.

USACE has established that on non-tidal waters, the OHWM is the line on the shore established by the fluctuations of the water and indicated by physical characteristics such as a clear, natural line impressed on the bank; shelving; changes in the character of the soil; destruction of terrestrial vegetation; the presence of litter and debris; or other appropriate means that consider the characteristics of the surrounding areas (33 CFR 329.11).

Within the study area, the OHWM indicators were identified and mapped in the field. The OHWM indicators were recorded and the average width and depth of the water at the OHWM of other waters were documented. Measured field data were compared with aerial photographs and topographic maps.

Appendixes A, D, and E contain onsite photographs, stream and waterbody functional assessment forms, and Maryland Department of Natural Resources Stream Health Data Sheets, respectively.



Chapter 4 – Existing Conditions

The study area is located within the Blue Ridge Province, an area of central Maryland underlain mainly by folded and faulted sedimentary rocks which are exposed in Frederick County in a large anticlinal fold which includes Catoctin Mountain (Maryland Geological Survey, 2020). The USGS topographic maps indicate the following two waterbodies crossing the study area: Unnamed Tributary (UNT) to Big Hunting Creek and Owens Creek (USGS, 2019a) (Figure 2). These streams are indicated on the USGS topographic maps as perennial waters. The USFWS NWI data identifies four wetland features within the study area: freshwater pond (PUBHh), freshwater forested/shrub wetlands (PFO1C), and riverine (R3UBH, R5UBH) wetlands (USFWS, 2020; Figure 3). NHD mapping also indicates two streams crossing the study area: a UNT to Big Hunting Creek, and Owens Creek (USGS, 2020). No floodplains are mapped within the study area by FEMA; however, please note that the flood study for Owens Creek ends just downstream of the study area (FEMA, 2021).

The study area is located within the Blue Ridge Mountains Ecoregion (Ecoregion 66) of Maryland (Woods et al., 2017; Woods et al., 1999). The Blue Ridge Mountains Ecoregion is a narrow strip of forested, well dissected, mountainous ridges. Local relief is high, channel gradients are steep, and streams are cool and clear (Woods et al., 1999). The study area is within two sub-ecoregions (Figure 1). The majority of the study area is within the Northern Igneous Ridges Sub-ecoregion (i.e. Ecoregion 66a). This sub-ecoregion is underlain by Precambrian and Paleozoic metavolcanics and igneous rock. It consists of pronounced ridges separated by high gaps and coves with mountainsides being steep and well dissected. The natural vegetation is identified as Appalachian Oak Forest dominated by white and red oaks and the region remains extensively forested (Woods et al., 1999). A small portion in the southeastern portion the study area near the park entrance is mapped within the Northern Sedimentary and Metasedimentary Ridges Sub-ecoregion (Ecoregion 66b). This sub-ecoregion is composed of high, steeply sloping ridges and deep, narrow valleys. Ecoregion 66b is underlain by erosion-resistant sedimentary and metasedimentary rock of Cambrian age. The surface is stony, steep, and soils can be acidic with low fertility. Natural vegetation was also identified as Appalachian Oak Forest and remains primarily forested (Woods et al., 1999).

Land use within the vicinity of Catoctin Mountain Park is primarily characterized by public parks, agricultural, and residential uses. Land use within and adjacent to the study area is characteristic of a NPS facility. The majority of the utility route is within existing utility corridors for sanitary sewer and water located within forested areas. The existing utility alignments were originally built from 1936 to 1938 and upgraded in 1975 and 1984. A portion of the study area will be new alignment consisting of approximately 800 feet of shared utility corridor between the southern cabins in Campy Misty Mount up to the existing gravel service road to the Blue Blazes Well #2. The new alignment will be located within undeveloped forest. The remaining portions of the study area are



developed with park facilities including hiking/horseback riding trails, cabins, meeting halls, athletic/recreational facilities, paved and gravel roads, and supporting infrastructure.

The Project is located within the Monocacy watershed (HUC 02070009) (USGS, 2019b). The study area straddles a local watershed divide, with the north portion in the Owens Creek watershed (HUC 020700090504) and the southern portion in the Hunting Creek watershed (HUC 020700090505) (United States Environmental Protection Agency [EPA], 2020).

The annual average total precipitation in the Project vicinity is 45.76 inches. The average low winter temperature is 21.4 degrees Fahrenheit and the average high summer temperature is 85.8 degrees Fahrenheit (USDA-NRCS, 2021b). Assessment of local precipitation records via the Climate Analysis for Wetlands Tables (WETS) data from the Emmitsburg 2 Southeast, Maryland Station indicates that climatic conditions were wetter than normal for December 2020, but November 2020 had normal precipitation amounts. January 2021 had drier than normal conditions (National Oceanic and Atmospheric Association Agricultural Applied Climate Information System [NOAA AgACIS], 2021). Approximately 0.01 inch of rainfall occurred at the weather station in the week preceding field observations. During the December 2020 surveys approximately 0.7 inches of rainfall occurred and 1.24 inches of precipitation occurred at the study area in the week preceding field observations in January (NOAA AgACIS, 2021). Precipitation occurred during the December 2020 survey consisting of rain and snow. However, conditions did not appear to be wetter than normal for this time of year.

Most of the Project is within Zone X which is defined as an Area of Minimal Flood Hazard (Figure 3) (FEMA, 2021). However, the portion of the Project near Owens Creek Campground is outside the limits of the flood study performed by FEMA for Owens Creek. It is expected that the portions of the Project study area adjacent to Owens Creek are within the 100-year floodplain.

The soil map units within Frederick County, Maryland are described in the Soil Resource Report for Frederick County and the Web Soil Survey online database (USDA-NRCS, 2002; USDA-NRCS, 2021a). These data sources indicate that the Project is underlain by Bagtown cobbly loam, Foxville and Hatboro soils, Highfield gravelly silt loam, Lantz-Rohrersville silt loam, Ravenrock-Highfield-Rock outcrop complex, and Ravenrock-Rohrersville complex. Figure 3 shows soil types and their respective distributions within the study area. Table 4-1 provides brief descriptions of each soil type (USDA-NRCS, 2002).



Table 4-1. Soil Map Units Identified in the Study area

Study Area	Soil Map Unit	Map Unit Name	Hydric Soil Designation	Description	Percentage of the Study Area
Bagtown Series	BaB	Bagtown cobbly loam, 3 to 8 percent slopes, extremely stony	Less than 1 percent hydric components; non-hydric	Soil found in mountains on backslopes and footslopes; surface layer cobbly loam; well drained	1.52%
Foxville Series	FxA	Foxville and Hatboro soils, 0 to 3 percent slopes	33 to 65 percent hydric components; partially hydric	Soil found in mountains on narrow, high-gradient floodplains; surface layer cobbly silt loam; somewhat poorly drained	4.43%
Highfield Series	HgB	Highfield gravelly silt loam, 3 to 8 percent slopes	Less than 1 percent hydric components; non-hydric	Soil found in mountains and valleys on summits and backslopes; surface layer gravelly silt loam; well drained	14.29%
Highfield Series	HhB	Highfield gravelly silt loam, 3 to 8 percent slopes, very stony	Less than 1 percent hydric components; non-hydric	Soil found in mountains and valleys on summits and backslopes; surface layer gravelly silt loam; well drained	13.10%
Highfield Series	HhC	Highfield gravelly silt loam, 8 to 15 percent slopes, very stony	Less than 1 percent hydric components; non-hydric	Soil found in mountains and valleys on summits and backslopes; surface layer gravelly silt loam; well drained	8.07%
Highfield Series	HhD	Highfield gravelly silt loam, 15 to 25 percent slopes, very stony	Less than 1 percent hydric components; non-hydric	Soil found in mountains and valleys on summits and backslopes; surface layer gravelly silt loam; well drained	0.25%
Lantz Series	LaB	Lantz-Rohrersville silt loams, 0 to 8 percent slopes, extremely stony	33 to 65 percent hydric components; partially hydric	Soil found in valleys and mountains in depressions, swales, and drainageways; surface layer silt loam; very poorly drained	0.14%



Study Area	Soil Map Unit	Map Unit Name	Hydric Soil Designation	Description	Percentage of the Study Area
Ravenrock Series	ReB	Ravenrock-Highfield-Rock outcrop complex, 0 to 8 percent slopes	Less than 1 percent hydric components; non-hydric	Soil found in mountains on shoulders and backslopes; surface gravelly loam; well drained; spring seeps are common in the lower concave portions of the map unit	9.71%
Ravenrock Series	ReC	Ravenrock-Highfield-Rock outcrop complex, 8 to 15 percent slopes	Less than 1 percent hydric components; non-hydric	Soil found in mountains on shoulders and backslopes; surface gravelly loam; well drained	25.56%
Ravenrock Series	ReD	Ravenrock-Highfield-Rock outcrop complex, 15 to 25 percent slopes	Less than 1 percent hydric components; non-hydric	Soil found in mountains on shoulders and backslopes; surface gravelly loam; well drained; spring seeps are common in the lower concave portions of the map unit	8.20%
Ravenrock Series	ReF	Ravenrock-Highfield-Rock outcrop complex, 25 to 65 percent slopes	Less than 1 percent hydric components; non-hydric	Soil found in mountains on shoulders and backslopes; surface gravelly loam; well drained	3.46%
Ravenrock Series	RfC	Ravenrock-Rohrersville complex, 3 to 15 percent slopes, extremely stony	1 to 32 percent hydric components; predominantly non-hydric	Soil found in mountains on shoulders and backslopes; surface gravelly loam; well drained	11.25%



Chapter 5 – Results

5.01 Wetland and Preliminary Jurisdictional Water Resources

Six wetlands and ten waterbodies were identified during the preliminary delineation field survey conducted December 14, 2020 through December 16, 2020 and January 7, 2021 through January 8, 2021. To account for an updated utility placement alignment shift, an additional survey was completed on May 6, 2021. During the May 6, 2021 survey, one additional waterbody was delineated. Of the six wetlands, only four were located within the survey area of the re-aligned utility placement. Of the 11 waterbodies, only ten were located within the survey area of the re-aligned utility placement. Each resource is described in the following subsections and summarized in Tables 5-1 and 5-2. Figure 4 is a resource delineation map depicting the locations of the delineated features within the study area. Appendix A contains corresponding photographs. Appendix B and Appendix C contain Wetland Determination Data Forms and Wetland Function-Value Evaluation Forms, respectively. Appendix D and Appendix E contain stream and waterbody functional assessment forms and Maryland Department of Natural Resources Stream Health Data Sheets, respectively.

5.01.1 Wetlands

Five areas meet the three mandatory criteria for wetlands (hydrophytic vegetation, hydrology, and hydric soils) as outlined in the Delineation Manual (USACE, 1987). These areas also meet criteria for wetlands as outlined in the Wetlands Mapping Standard (FGDC, 2013). Preliminary jurisdictional delineated wetlands with their preliminary jurisdictional status are summarized in Table 5-1, Appendix B, Appendix C, Figure 4, and are described in detail in the following paragraphs.

Three of the wetlands delineated during the preliminary field delineations (W-KD-001-WET, W-KD-002-WET, and W-KD-006-WET) presented vegetation communities which can be problematic. Problematic hydrophytic vegetation can occur within a wetland that has been affected by climactic variability, spread of exotic species, agricultural uses, and other human land use practices (USACE, 2012). Wetlands containing problematic hydrophytic vegetation are identified using a combination of observations made in the field and information from scientific literature. They must contain the appropriate indicators of hydric soil and wetland hydrology, unless these factors are also disturbed or problematic (USACE, 2012). The wetland landscapes that typically exhibit problematic hydrophytic vegetation include concave surfaces, active floodplain, toe slopes, and areas with groundwater discharge (seeps). Seeps make up a large percentage of areas with problematic hydrophytic vegetation.

The three wetlands identified with problematic vegetation all contain hydric soils and exhibit at least one primary or two secondary indicators of wetland hydrology. However, a one of the wetlands delineated in the study area contained invasive species such as Japanese barberry (*Berberis thunbergii*), which are both classified as facultative upland



(FACU). Japanese barberry is known to occur in wetlands often forming dense thickets (Swearingen et al., 2010, and Zouhar, 2008). The wetland within the study area in which this species was observed are typically groundwater/seep wetlands or wetlands associated with headwaters streams. Based on the literature reviewed, this wetland may be an example of a Central Appalachian Seepage Swamp, a community which occurs at elevations up to 3,200 ft, is underlain by metabasalt and other mafic rocks, base-rich granitic rocks, calcareous shale, and limestone, and has an overstory with mixed composition (which can include tulip poplar [*Liriodendron tulipifera*] and a herbaceous cover that often features a patchy dominance of skunk cabbage [*Symplocarpus foetidus*]) (Virginia Department of Conservation and Recreation, 2020). The substrate is saturated for extended periods during the growing season, but surface water is not generally present for more than short periods of time (NatureServe Explorer, 2020). Sub-canopy species in these types of wetlands can include American hornbeam (*Carpinus caroliniana*) (NatureServe Explorer, 2020).



Table 5-1. Potential Preliminary Jurisdictional Wetlands

Count	ID	Figure Sheet Number	Cowardin Classification ^a	Acreage within the Limits of Disturbance ^b	Mapped NWI Feature	Jurisdictional Status ^c	Watershed Name	TNW Connection ^d
1	W-KD-001-WET	4-C	Palustrine Forested	0	Along a R3UBH	Jurisdictional	Hunting Creek	Abutting S-KD-004, a UNT Big Hunting Creek
2	W-KD-002-WET	4-K	Palustrine Forested	0.006	PFO1C	Jurisdictional	Owens Creek	Abutting S-KD-006, Owens Creek
3	W-KD-003-WET	4-B	Palustrine Forested	0.065	No	Jurisdictional	Hunting Creek	Abutting S-KD-001, a UNT Big Hunting Creek
4	W-KD-004-WET	4-G	Palustrine Forested	0.004	No	Jurisdictional	Owens Creek	Abutting S-KD-008, a UNT Owens Creek
5	W-KD-005-WET	4-F	Palustrine Forested	0	No	Jurisdictional	Hunting Creek	Hydrologically connected outside of the study area
6	W-KD-006-WET	4-E	Palustrine Forested	0	No	Jurisdictional	Owens Creek	Abutting S-KD-009, a UNT Owens Creek
TOTAL				0.075				

^[a] Cowardin et. al 1979.

^[b] Acreage of wetlands within the proposed limits of disturbance footprint excluding the buffer area. Acreage rounded to the nearest 0.01 acre unless feature is under 0.01 acre than rounded to nearest 0.001.

^[c] Jurisdictional status is the opinion of the professional delineator and should be considered preliminary until concurrence by USACE is obtained.

^[d] Based on the results of pre-application site visits

TNW = Traditional Navigable Waters



W-KD-001-WET (Figure 4) is a palustrine forested persistent wetland with two vegetative layers, a tree layer and an herbaceous layer. The sample plot was dominated by American beech (*Fagus grandifolia*) and skunk cabbage (*Symplocarpus foetidus*). It is noted that this delineation occurred during the winter season when much of the vegetation was dormant or dead for the winter. It is a wetland with problematic hydrophytic vegetation, as defined by USACE (USACE, 2012) at the time of the delineation as the wetland was not dominated by typical wetland vegetation. It is expected that during the growing season, there is likely additional vegetation of FAC or wetter indicator status growing in the wetland. The soil profile within the sample plot consisted of 10YR 3/1 silt loam with 7 percent abundance of 5YR 5/8 concentrations in the pore lining from 0 to 16 inches. This soil profile meets the hydric soil indicator of a depleted matrix (F3). Hydrology indicators included a high-water table (A2), saturation at 8 inches depth (A3), hydrogen sulfide odor (C1), drainage patterns (B10), and geomorphic position (D2). This wetland would meet two out of three of the criteria for a wetland and will likely meet all three criteria during the growing season. A discussion of the problematic vegetation encountered during the field survey is included in the summary paragraph in Section 5.01.1. This wetland meets the hydrology and hydric soil indicators and is located along stream S-KD-004. This wetland's physical characteristics meet those of a seep wetland community described in Section 5.01.1. This wetland was determined to be outside the survey area for the re-aligned utility placement.

W-KD-002-WET (Figure 4) is a palustrine forested wetland located adjacent to Owens Creek. This area has been identified as a wetlands of special state concern. Therefore, the study area was extended to 100 feet beyond the limits of disturbance. The wetland has three vegetative layers: tree stratum, sapling/shrub stratum, and an herbaceous stratum. The sample plot was dominated by tulip poplar (*Liriodendron tulipifera*), American hornbeam (*Carpinus caroliniana*), witch hazel (*Hamamelis virginiana*), Japanese barberry (*Berberis thunbergii*), skunk cabbage and jewelweed (*Impatiens capensis*). The dominant species in the tree stratum and sapling/shrub stratum are all FACU. It is noted that this delineation occurred during the winter season when much of the vegetation was dormant or dead for the winter. The soil profile within the sample plot consisted of 10YR 2/2 fine loam for the top 6 inches; below that (from 6 inches to 10 inches) the soil consisted of 10YR 4/2 fine loam with 5 percent redox concentrations in the matrix. The soil profile meets the hydric soil indicator of a depleted matrix (F3). Hydrology indicators included drainage patterns (B10), geomorphic position (D2), and microtopographic relief (D4). This wetland meets two out of three of the criteria for a wetland (hydric soils and wetland hydrology) and is located within the floodplain of S-KD-006 (Owens Creek). It will likely meet all three criteria during the growing season. The wetland contains problematic hydrophytic vegetation at the time of delineation (the dominant plants in the tree and sapling/shrub strata are FACU); however, this wetland displays the characteristics of a seep wetland as described in Section 5.01.1, which often contain the non-hydrophytic species observed in this wetland.

W-KD-003-WET (Figure 4) is a palustrine forested wetland with three vegetative layers: a tree stratum, a shrub stratum, and an herbaceous stratum. The sample plot was



dominated by tulip poplar, pawpaw (*Asimina triloba*), Japanese stilt grass (*Microstegium vimineum*), and leafy bulrush (*Scirpus polyphyllus*). The soil profile within the sample plot consisted of 10YR 4/2 silty loam for the top 4 inches; below that, the soil consisted of 2.5Y 5/2 silty loam with 10 percent 7.5YR 6/6 depletions within the matrix from 4 inches to 14 inches. The soil profile meets the hydric soil indicator of a depleted matrix (F3). Hydrology indicators included a high-water table at 6 inches (A2), saturation at 3 inches (A3), drainage patterns (B10), geomorphic position (D2), and microtopographic relief (D4). Hydrophytic vegetation was indicated by the dominance test. This wetland meets the indicator for hydric soil and exhibits two primary indicators of wetland hydrology.

W-KD-004-WET (Figure 4) is a palustrine forested wetland with three vegetative layers: a tree stratum, a shrub stratum, and an herbaceous stratum. The sample plot was dominated by red maple (*Acer rubrum*), Japanese barberry, Japanese stilt grass, and grass-leaved goldenrod (*Euthamia graminifolia*). The indicator statuses of the tree stratum is FAC, shrub stratum FACU, and herbaceous stratum is a mix of OBL and FAC. Although red maple is a FAC species, it can be a primary wetland species in swamp-forest systems, including red maple seepage swamp forests (Explore Natural Communities, 2021) and broadleaf palustrine woodlands (Fike, Jean & Pennsylvania Natural Diversity Inventory, 1999). It is noted that this delineation occurred during the winter season when much of the vegetation was dormant or dead for the winter. The soil profile within the sample plot consisted of 10YR 3/1 silty loam with 10 percent concentrations located in the matrix from 0 inch to 10 inches; below this was 2.5YR 4/3 silty clay loam from 10 inches to 16 inches. The soil profile meets the hydric soil indicator of redox dark surface (F6). Hydrology indicators included surface water with depth of 1 inch (A1), high-water table (A2) at 3 inches, saturation at the surface (A3), oxidized rhizospheres on living roots (C3), drainage patterns (B10), and microtopographic relief (D4). This feature's vegetation meets the dominance test hydrophytic vegetation indicator, meets one indicator of hydric soil, and multiple primary and secondary wetland hydrology indicators.

W-KD-005-WET (Figure 4) is a palustrine scrub/shrub wetland with two vegetative layers: shrub stratum and herbaceous stratum. The sample plot was dominated by spicebush (*Lindera benzoin*), multiflora rose (*Rosa multiflora*), and Japanese stilt grass. Within the shrub stratum, vegetation is FAC and FACU; within the herbaceous stratum vegetation is a mix of FAC and OBL. It is noted that this delineation occurred during the winter season when much of the vegetation was dormant or dead for the winter. The soil profile within the sample plot consisted of 10YR 2/2 silty clay loam with 10 percent 7.5YR 4/6 concentrations within the pore lining from 0 inch to 6 inches. At 6 inches depth, rock was encountered. The soil profile meets the hydric soil indicator of redox dark surface (F6). Hydrology indicators included surface water with depth of 1.5 inches (A1), high-water table (A2) at 3 inches, saturation at the surface (A3), water marks (B1) and water-stained leaves (B9). This feature's vegetation meets the dominance test hydrophytic vegetation indicator, meets one indicator of hydric soil, and multiple primary



and secondary wetland hydrology indicators. This wetland was determined to be outside the survey area for the re-aligned utility placement.

W-KD-006-WET (Figure 4) is a palustrine forested wetland with three vegetative layers: tree stratum, shrub stratum and herbaceous stratum. The sample plot was dominated by green ash (*Fraxinus pennsylvanica*), black tupelo (*Nyssa sylvatica*), white oak (*Quercus alba*), Shagbark hickory (*Carya ovata*), Japanese barberry, and Japanese stilt grass. Within the tree stratum, vegetation indicator status is a mix of FACU, FAC, and FACW; the shrub stratum is FACU (it is noted this is an invasive species, Japanese barberry); and the herbaceous layer is FAC (it is noted this is an invasive species, Japanese stilt grass). It is noted that this delineation occurred during the winter season when much of the vegetation was dormant or dead for the winter. The soil profile within the sample plot consisted of 10YR 2/2 silty loam with 10 percent 10YR 4/6 concentrations throughout the matrix from 0 inch to 6 inches; below is a 10YR 4/6 silty clay loam from 6 inches to 10 inches. At 10 inches depth, rock was encountered. The soil profile meets the hydric soil indicator of redox dark surface (F6). Hydrology indicators included 0.5 inch of surface water (A1), high-water table at surface (A2), saturation at surface (A3), and water-stained leaves (B9). This wetland exhibits problematic hydrophytic vegetation. Invasive species, such as Japanese barberry, can invade wetlands and form dense thickets (Swearingen et al., 2010), which would increase the presence of FACU species. This wetland does meet one indicator of hydric soil and one primary indicator of wetland hydrology. It is located along S-KD-009 (UNT Owens Creek), therefore problematic hydrophytic vegetation can be used to support this feature's wetland status.

5.01.2 Waterbodies

Ten waterbody features were identified within the study area (Table 5-2) and one waterbody identified during the preliminary field surveys was identified outside the study area. Six of the identified features are first order streams, four are second order streams and one is a roadside ditch (Table 5-2). The ditch (S-KD-007) is ephemeral and is non-jurisdictional under the Clean Water Act. The remaining stream features are preliminary jurisdictional under the Clean Water Act. Functional stream health for the waterbody features was overall Fair (Table 6-2).



Table 5-2. Potential Preliminary Jurisdictional Watercourse and Waterbodies'

Count	ID	Figure Sheet Number	Waterbody Name	Flow Regime/Stream Order	Length within Study Area (linear feet) ^a	Acreage within Proposed Utility Alignment (acres) ^b	Waters Type	Jurisdictional Status ^{d, e, f}	TNW Connection ^f	Stream Designation ^g
1	S-KD-001	4-B	UNT Blue Blazes Run	Intermittent / First Order	4	0.003	NRPW	Jurisdictional	Hunting Creek	I
2	S-KD-002	4-B	UNT Blue Blazes Run	Intermittent / First Order	4	0.003	NRPW	Jurisdictional	Hunting Creek	I
3	S-KD-003	4-A	Blue Blazes Run	Perennial / Second Order	17.75	0.01	RPW	Jurisdictional	Hunting Creek	III-P
4	S-KD-004	4-C	Blue Blazes Run	Perennial / First Order	9.25	0.002	RPW	Jurisdictional	Hunting Creek	I
5	S-KD-005	4-K	UNT Owens Creek	Perennial / Second Order	35	0.007	RPW	Jurisdictional	Owens Creek	III-P
6	S-KD-006	4-K	UNT Owens Creek	Intermittent / First Order	1	0	RPW	Jurisdictional	Owens Creek	I
7	S-KD-007	4-J	UNT Owens Creek	Ephemeral / Ditch	3.5	0	NRPW	Non-Jurisdictional	Owens Creek	I
8	S-KD-008	4-G	UNT Owens Creek	Perennial / Second Order	0	0	RPW	Jurisdictional	Owens Creek	I
9	S-KD-009	4-E	UNT Owens Creek	Perennial / Second Order	0	0	RPW	Jurisdictional	Owens Creek	I
10	S-KD-010	4-A	UNT Blue Blazes Run	Intermittent / First Order	0	0	RPW	Jurisdictional	Hunting Creek	I
11	S-RR-001	4-B	UNT Blue Blazes Run	Intermittent / First Order	4	0.003	NPRW	Jurisdictional	Hunting Creek	I
Totals					78.5	0.028				

^[a] Linear feet rounded to the nearest foot; S-KD-004 was culverted under the Study Area

^[b] Acreage of stream features within the proposed utility alignment excluding the buffer area. Acreage rounded to the nearest 0.01 acre unless feature is under 0.01 acre than rounded to nearest 0.001.

^[c] Maryland Department of Natural Resources Stream Health Data Sheet.

^[d] Jurisdictional status is the opinion of the professional delineator and should be considered preliminary until concurrence by USACE is obtained.

^[e] Ephemeral streams are not subject to jurisdiction per 33 CFR 328.3

^[f] Based on the results of pre-application site visits

^[g] Designated Water Uses as defined by Code of Maryland Regulations Sections 26.08.02.02, 26.08.02.02-1, and 26.08.02.08. Waterbodies within the study area have been identified Use I (Water Contact Recreation, and Protection of Non-tidal Warmwater Aquatic Life), and Use III-P (non-tidal cold water and public water supply).

Notes:
NRPW = Non-Relatively Permanent Waters; RPW = Relatively Permanent Waters; TNW = Traditional Navigable Waters



S-KD-001 (Figure 4) is an intermittent stream (0.002 acre, natural waterbody). Within the assessment area, the dominant substrate is cobbles. The average depth was less than 1 inch, stream width 1 foot, top of bank (TOB) 3 feet, and OHWM was 1 foot as indicated by sediment sorting. No significant erosion was observed. Channel geometry is relatively straight. The overall stream health assessment is fair with this feature scoring good on floodplain vegetation, channel alteration, embeddedness, and erosion characteristics.

S-KD-002 (Figure 4) is an intermittent stream (0.003 acre, natural waterbody). Within the assessment area, the dominant substrate is cobbles. The average depth was less than 1 inch, stream width 1 foot, TOB 3 feet, and OHWM was 1 foot as indicated by sediment sorting. No significant erosion was observed. Channel geometry is relatively straight. The overall stream health assessment is fair with this feature scoring good on floodplain vegetation, channel alteration, embeddedness, erosion characteristics, and riparian buffer width characteristics.

S-KD-003 (Figure 4) is a perennial stream (0.01 acre, natural waterbody). Within the assessment area, the dominant substrate are cobbles and gravel. The average depth was 2 inches, stream width 4 feet, TOB 8 feet, and OHWM was 4 feet as indicated by sediment sorting, soil characteristic change, and shelving. No significant erosion was observed. Channel geometry is relatively straight. The overall stream health assessment is fair with this feature scoring good on floodplain vegetation, channel alteration, and riparian buffer width characteristics.

S-KD-004 (Figure 4) is a perennial stream (0.002 acre, natural waterbody). Within the assessment area, the dominant substrate are cobbles and gravel. The average depth was 2 inches, stream width 5 feet, TOB 8 feet, and OHWM was 5 feet as indicated by sediment sorting, soil characteristic change, and shelving. No significant erosion was observed. Channel geometry is relatively straight. The overall stream health assessment is fair with this feature scoring good on floodplain vegetation and riparian buffer width characteristics.

S-KD-005 (Figure 4) is a perennial stream (0.007 acre, natural waterbody). Within the assessment area, the dominant substrate are cobbles and gravel. The average depth was 2 inches, stream width 20 feet, TOB 25 feet, and OHWM was 20 feet as indicated by sediment sorting, soil characteristic change, and shelving. No significant erosion was observed. Channel geometry is relatively straight. The overall stream health assessment is good with this feature scoring good on floodplain vegetation, embeddedness, attachment sites for macroinvertebrates, riparian buffer width, and bank stability characteristics.

S-KD-006 (Figure 4) is an intermittent stream (0.0 acre, natural waterbody). Within the assessment area, the dominant substrate is gravel. The average depth was 1 inch, stream width 10 feet, TOB 12 feet, and OHWM was 10 feet as indicated by sediment sorting, soil characteristic change, shelving, and clear natural line on bank. No



significant erosion was observed. Channel geometry is relatively straight. The overall stream health assessment is good with this feature scoring good on floodplain vegetation, channel alteration, and riparian buffer width characteristics.

S-KD-007 (Figure 4) is an ephemeral stream (0.0004 acre, artificial waterbody). Within the assessment area, the dominant substrate is silt. The stream had no water at the time of survey, TOB 3 feet, and OHWM was 1 foot as indicated by sloughing banks. No significant erosion was observed. Channel geometry is relatively straight. The overall stream health assessment is marginal with this feature scoring marginal or poor on all characteristic metrics.

S-KD-008 (Figure 4) is a perennial stream (0.0 acre, natural waterbody). Within the assessment area, the dominant substrate are rocks, cobbles, and gravel. The average depth was 3 inches to 4 inches, stream width 2 feet, TOB 4 feet, and OHWM was 3 feet as indicated by stained vegetation. No significant erosion was observed. Channel geometry is slightly sinuous. The overall stream health assessment is fair with this feature scoring good on channel alteration, embeddedness, attachment sites for macroinvertebrates, and riparian buffer width characteristics.

S-KD-009 (Figure 4) is a perennial stream (0.0 acre, natural waterbody). Within the assessment area, the dominant substrate are rocks and gravel. The average depth was 2 inches, stream width 2 feet, TOB 3 feet, and OHWM was 3 feet as indicated by stained vegetation. No significant erosion was observed. Channel geometry is slightly sinuous. The overall stream health assessment is good with this feature scoring good on channel alteration, embeddedness, erosion, attachment sites for macroinvertebrates, and bank stability characteristics.

S-KD-010 (Figure 4) is an intermittent stream natural waterbody located outside of the border of the re-aligned utility placement and associated study area. Within the assessment area, the dominant substrate is gravel and silt. The average depth was 3 inches, stream width 2 feet, TOB 2 feet, and OHWM was 2 feet as indicated by stained vegetation and drainage patterns. The channel exhibits signs of flashy storm events with some erosion. Channel geometry is relatively straight. The overall stream health assessment is fair with this feature scoring good on channel alteration and erosion characteristics.

S-RR-001 (Figure 4) is an intermittent stream (0.003 acre, natural waterbody) located on the border of the 25-foot buffer of the utility alignment. Within the assessment area, the dominant substrate is cobbles and boulders. The average depth was 1 inch, stream width 1 foot, top of bank (TOB) 3 feet, and OHWM was 1 foot as indicated by sediment sorting. No significant erosion was observed. Channel geometry is relatively straight. The overall stream health assessment is fair with this feature scoring good on floodplain vegetation, channel alteration, embeddedness, and erosion characteristics.



5.02 Uplands

Upland areas within the study area include maintained lawn and trails; impervious surfaces including park buildings, sidewalks, and parking lots; and Park Central Road, the main right-of-way road that navigates through CATO.

Species identified within herbaceous upland communities included Japanese stilt grass and Christmas fern (*Polystichum acrostichoides*). Ornamental trees and shrubs occur within the maintained lawn and surrounding park buildings, including American beech, white ash (*Fraxinus americana*), tulip poplar, northern red oak (*Quercus rubra*), and Japanese barberry and wineberry (*Rubus phoenicolasius*).

Soils in upland areas ranged from loam to silty loam and silty clay loam. Wetland hydrology indicators were rarely met within upland areas surveyed. In all cases, uplands lacked at least one of the three wetland parameters.



Chapter 6 – Functional Assessment

6.01 2015 Highway Methodology Workbook Supplement

An assessment of wetland functions and values was conducted to facilitate evaluation of the Project's impacts on waters of the U.S. (including wetlands) and "other waters". The functional assessment methodology used was USACE's 2015 Highway Methodology Workbook Supplement (USACE, 2015). This method has been used for other recent NPS projects to meet regulatory requirements and NPS Director's Order # 77-1.

Wetlands were additionally evaluated based on their function and values. Wetland functions as defined by USACE are self-sustaining properties of a wetland ecosystem that exist in the absence of society, resulting from both living and non-living components of a wetland, including processes necessary for the self-maintenance of the wetland ecosystem. Wetland values as defined by USACE are benefits that derive from either one or more functions and the physical characteristics associated with a wetland, with most wetlands having a corresponding societal value (USACE, 2015). Wetlands were evaluated based on the 13 functions and values listed in the Supplement and considered by the Regulatory Branch for a Section 404 wetland permit (USACE, 2015). Table 6-1 summarizes the principal function(s) and value(s) of each wetland.

Generally, the delineated wetlands' principal functions and values consisted of floodflow alteration, production export, uniqueness/heritage, educational/scientific value, and wildlife habitat. The most common rationale for principal function of floodflow alteration includes: the wetland contains hydric soils; the wetland exists in a relatively flat area that has flood storage potential; and the wetland receives and retains overland or sheet flow runoff from surrounding uplands. The most common rationale for principal function of production export includes: wildlife food sources grow within the wetland; detritus development is present within the wetland; and evidence of wildlife use found within the wetland. The most common rationale for wildlife habitat includes: the wetland is not degraded by human activity; the wetland is not fragmented by development; wildlife overland access to other wetlands is present; and animal signs observed (such as tracks scats, nesting areas, etc.). The most common rationale for principal value of educational/scientific value includes: little or no disturbance is occurring in this wetland; the wetland is located within a nature preserve or wildlife management area; and a potential educational site is within safe walking distance to other plant communities. Finally, the most common rationale for the principal value of uniqueness/heritage are no known safety hazards exist within this potential educational site, and overall view of the wetland is available from the surrounding upland.

W-KD-001-WET (Figure 4) This wetland's principal function and values include production export, uniqueness/heritage, recreation, and endangered species habitat. This wetland is at a known location of a red Canada lily (*Lilium canadense*) identified by



the NPS. The location of this plant was provided in a kmz, and noted as a rare plant within the file.

W-KD-002-WET (Figure 4) This wetland's principal function and values include fish and shellfish habitat, uniqueness/heritage, recreation and educational/scientific value.

W-KD-003-WET (Figure 4) This wetland's principal functions and value are production export, wildlife habitat, and uniqueness/heritage.

W-KD-004-WET (Figure 4) This wetland's principal functions include floodflow alteration, production export, and wildlife habitat.

W-KD-005-WET (Figure 4) This wetland's principal function and values include floodflow alteration, educational/scientific value, and uniqueness/heritage.

W-KD-006-WET (Figure 4) This wetland's principal functions and value include wildlife habitat, floodflow alteration, and educational/scientific value.

6.02 Maryland Department of Natural Resources Biological Stream Survey's Stream Health Data Sheet

An evaluation of the onsite non-tidal waters was conducted using the Maryland Department of Natural Resources Biological Stream Survey's Stream Health Data Sheet 2019 (Maryland Department of Natural Resources Biological Stream Survey, 2019). This form was used to characterize the health of freshwater streams using metrics including stream condition and physical characteristics. The form also includes sections to record information on biological and chemical characteristics. The sections on biological and chemical characteristics were not completed as part of the field visit because scope of this study did not allow for the collection of this information. Results of the evaluation are included in Table 6.2.



Table 6-1. Wetland Functions and Values

ID	Figure Sheet Number	Principal Function(s) / Value(s) ^a	Comments
W-KD-001-WET	4-C	Production export, uniqueness/heritage, recreation	Located within National Park, contains an NPS-identified rare plant species (this wetland is located outside of the re-aligned utility placement study area)
W-KD-002-WET	4-K	Uniqueness/heritage, recreation, educational/scientific value, fish and shellfish habitat	Forested, shade covers stream; adjoining stream is trout habitat, potential for rare or sensitive species previously surveyed, wetland is within 50 yards of the nearest perennial watercourse
W-KD-003-WET	4-B	Production export, uniqueness/heritage, wildlife habitat	Can view all of wetland from surrounding upland, surrounded by forested upland
W-KD-004-WET	4-G	Floodflow alteration, production export, wildlife habitat	Saturated soils present, evidence of wildlife use, including scat
W-KD-005-WET	4-F	Educational/scientific value, uniqueness/heritage, floodflow alteration	Ponded water present, potential vernal habitat in portion of wetland, historic cabins present, area closed during winter months (this wetland is located outside of the re-aligned utility placement study area)
W-KD-006-WET	4-E	Educational/scientific value, wildlife habitat, floodflow alteration	Potential for nesting birds, deer scat and tracks present, wetland is within 50 yards of the nearest perennial watercourse

^[a] Assessment based on USACE's Highway Methodology Workbook Supplement: Wetland Functions and Values, A Descriptive Approach (USACE, 2015)



Table 6-2. Preliminary Jurisdictional Watercourse and Waterbodies Functional Assessments

ID	Figure Sheet Number	Waterbody Name	Stream Score ^a	Analysis ^a	Scored Good (4) in following Characteristics ^a
S-KD-001	4-B	UNT Blue Blazes Run	26	Fair	Floodplain Vegetation, Channel Alteration, Embeddedness, Erosion, Riparian Buffer
S-KD-002	4-B	UNT Blue Blazes Run	26	Fair	Floodplain Vegetation, Channel Alteration, Embeddedness, Erosion, Riparian Buffer
S-KD-003	4-A	Blue Blazes Run	28	Fair	Floodplain Vegetation, Channel Alteration, Riparian Buffer
S-KD-004	4-C	Blue Blazes Run	28	Fair	Floodplain Vegetation, Riparian Buffer,
S-KD-005	4-K	UNT Owens Creek	32	Good	Floodplain Vegetation, Embeddedness, Attachment Sites for Macros, Riparian Buffer, Bank Stability
S-KD-006	4-K	UNT Owens Creek	30	Good	Floodplain Vegetation, Channel Alteration, Riparian Buffer
S-KD-007	4-J	UNT Owens Creek	16	Marginal	(none)
S-KD-008	4-G	UNT Owens Creek	28	Fair	Channel Alteration, Embeddedness, Attachment Sites for Macros, Riparian Buffer
S-KD-009	4-E	UNT Owens Creek	31	Good	Channel Alteration, Embeddedness, Erosion, Attachment Sites for Macros, Bank Stability
S-KD-010	4-A	UNT Blue Blazes Run	24	Fair	Channel Alteration, Erosion
S-RR-001	4-B	UNT Blue Blazes Run	28	Fair	Floodplain Vegetation, Channel Alteration, Embeddedness, Attachment Sites for Macros, Riparian Buffer

^[a] Assessment based on Maryland Department of Natural Resources Stream Health Data Sheet (MDNR, 2019)



Chapter 7 – References

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Figures



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LEGEND:

— Project Limits

Ecoregion

- Northern Igneous Ridges
- Northern Sedimentary and Metasedimentary Ridges

Locator Map

BASE MAP SOURCE:
ESRI USA TOPO MAP
BLUE RIDGE SUMMIT QUADRANGLE (1986)

0 600 1,200 2,400
FEET

N

Replace Parkwide Utility Infrastructure,
Catoclin Mountain Park,
Frederick County, Maryland

FIGURE 1
ECOREGION PROJECT LOCATION

PN: D3167628	Date: 5/26/2021
CREATED BY: RSB	Jacobs
REVIEWED BY: DS	

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LEGEND: — Project Limits — Study Area — HUC Divide	Locator Map PA NJ WV MD DC DE VA	BASE MAP SOURCE: ESRI USA TOPO MAP BLUE RIDGE SUMMIT QUADRANGLE (1986) 0 625 1,250 2,500 FEET	 N	 Replace Parkwide Utility Infrastructure, Catoctin Mountain Park, Frederick County, Maryland
	FIGURE 2 OVERVIEW MAP			
	PN: D3167628		Date: 5/26/2021	
	CREATED BY: RED		Jacobs	
REVIEWED BY: DS				

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LEGEND:

- Stream(NHD)
- Project Limits
- Soil Unit
- Wetland (NWI)
- 100yr Floodplain
- Study Area

Locator Map

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri

BASE MAP SOURCE:
AERIAL IMAGERY LAYER, 2014
STREAMS - USGS, NATIONAL HYDROGRAPHY DATASET (NHD),
NATIONAL WETLAND INVENTORY (NWI)
SOILS - USDA, SSURGO DATA

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FEET

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Replace Parkwide Utility Infrastructure, Catoclin Mountain Park, Frederick County, Maryland

FIGURE 3-A
SOILS, NHD, NWI, FEMA MAP

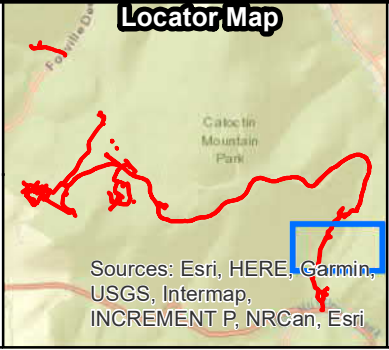
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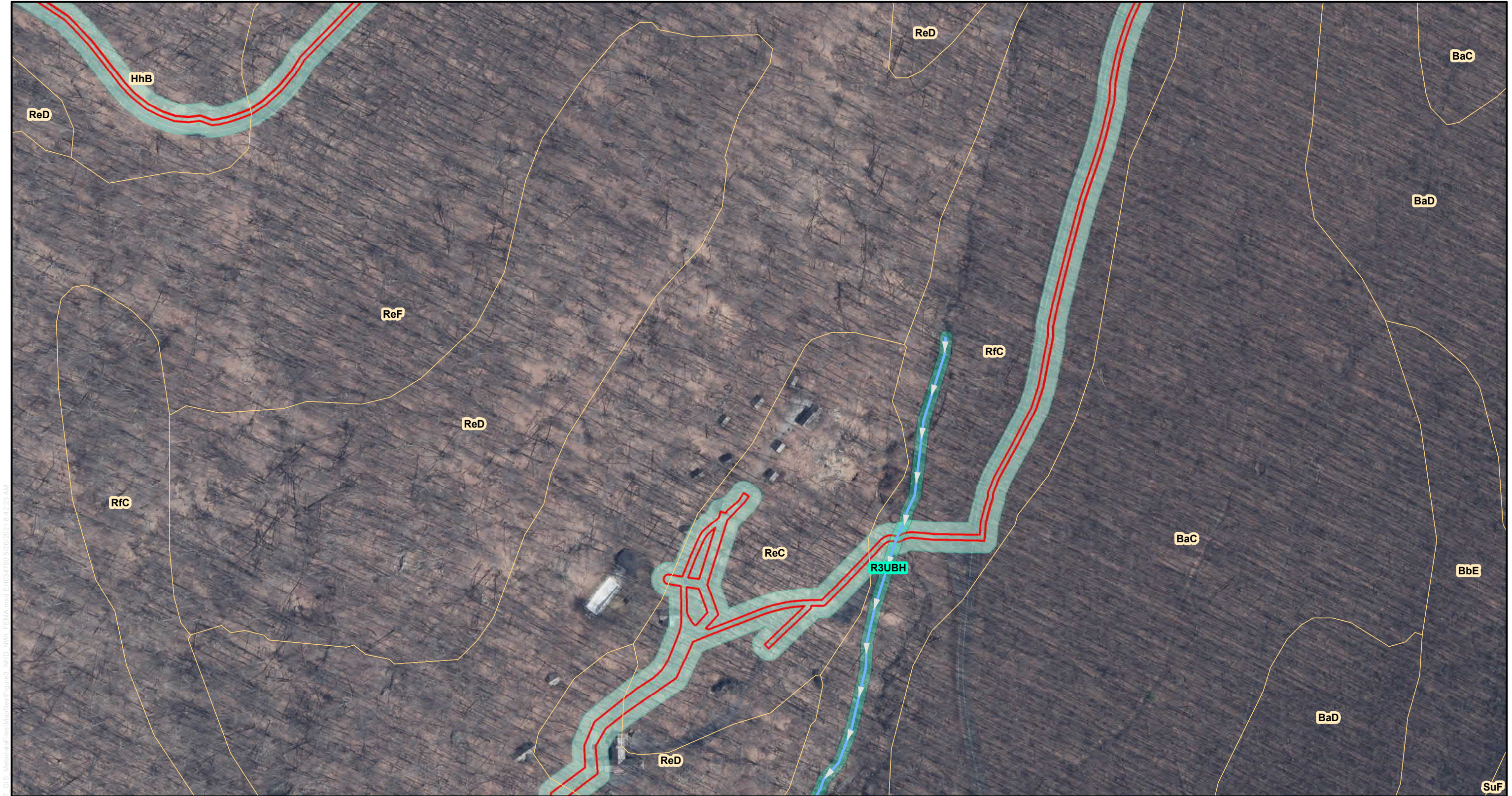
- Stream(NHD)
- Project Limits
- Soil Unit
- Wetland (NWI)
- 100yr Floodplain
- Study Area



BASE MAP SOURCE:
AERIAL IMAGERY LAYER, 2014
STREAMS - USGS, NATIONAL HYDROGRAPHY DATASET (NHD),
NATIONAL WETLAND INVENTORY (NWI)
SOILS - USDA, SSURGO DATA

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FEET

	Replace Parkwide Utility Infrastructure, Catoclin Mountain Park, Frederick County, Maryland
FIGURE 3-B SOILS, NHD, NWI, FEMA MAP	
PN: D3167628	Date: 5/26/2021
CREATED BY: RED	Jacobs
REVIEWED BY: DS	



LEGEND:

- Stream(NHD)
- Project Limits
- Soil Unit
- Wetland (NWI)
- 100yr Floodplain
- Study Area

Locator Map

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri

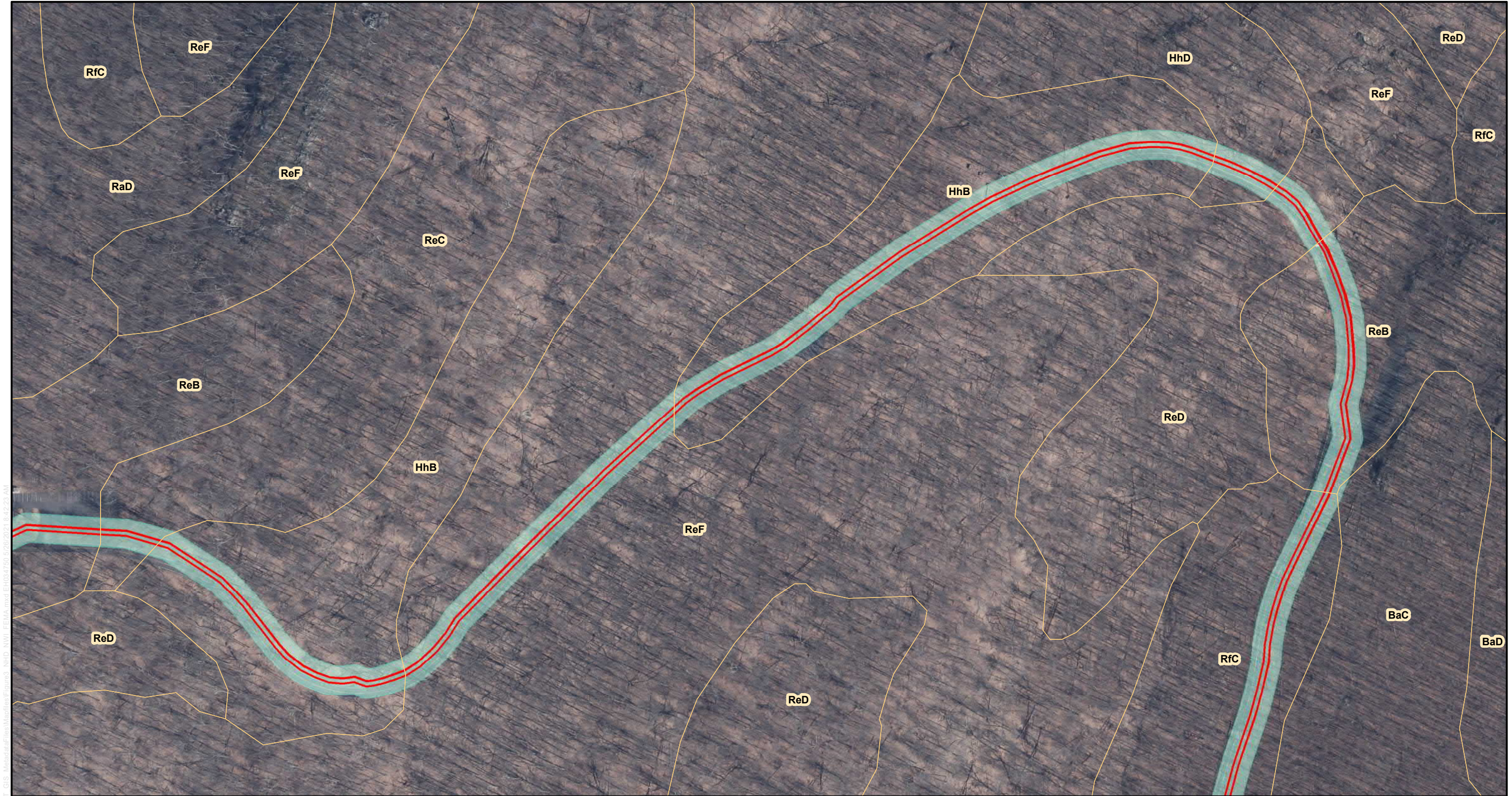
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SOILS - USDA, SSURGO DATA

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FEET

FIGURE 3-C
SOILS, NHD, NWI, FEMA MAP







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LEGEND:


-  Stream(NHD)
-  Project Limits
-  Soil Unit
-  Wetland (NWI)
-  100yr Floodplain
-  Study Area



BASE MAP SOURCE:
AERIAL IMAGERY LAYER, 2014
STREAMS - USGS, NATIONAL HYDROGRAPHY
DATASET (NHD),
NATIONAL WETLAND INVENTORY (NWI)
SOILS - USDA, SSURGO DATA


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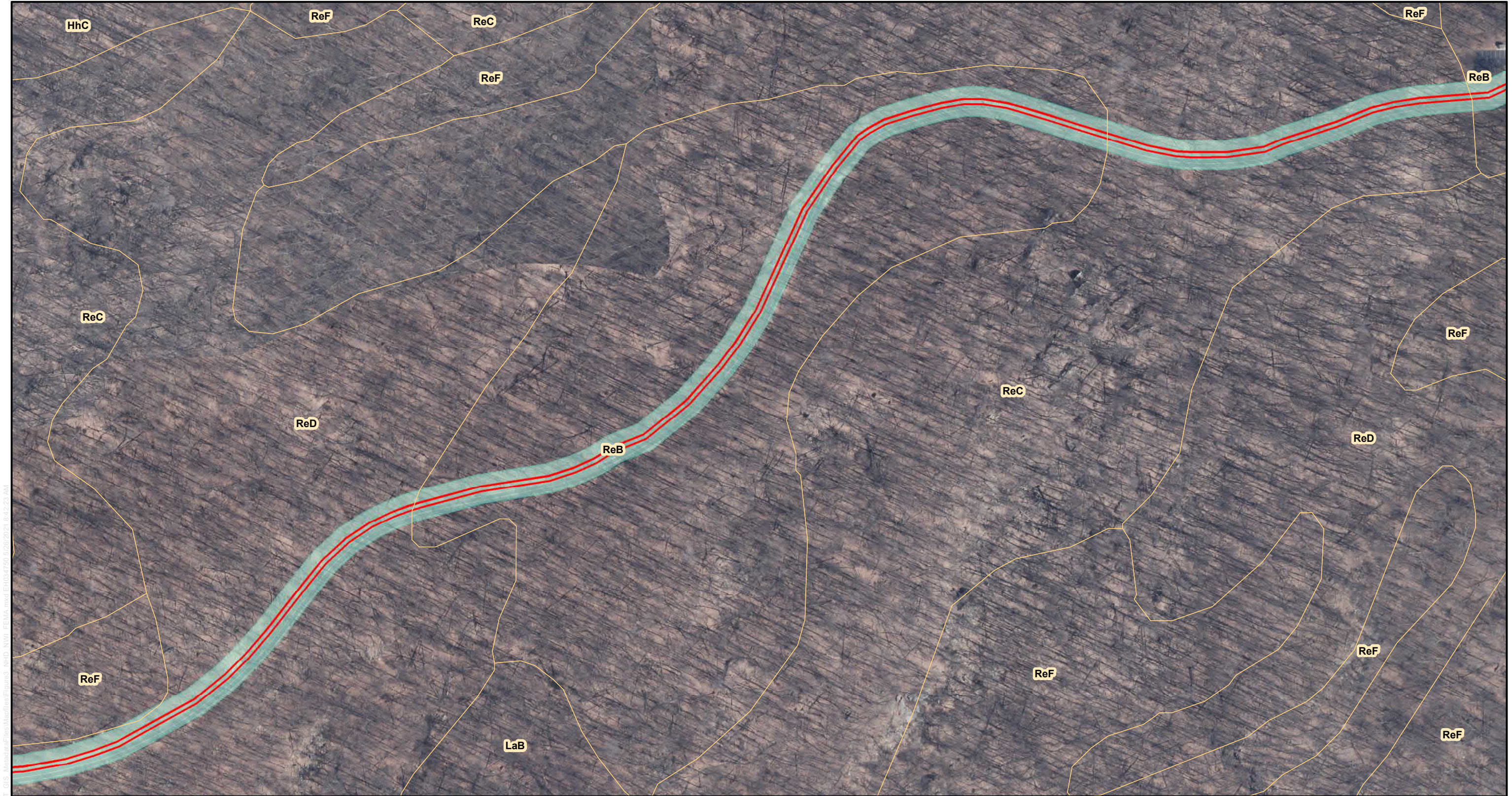




Replace Parkwide Utility
Infrastructure,
Catoclin Mountain Park,
Frederick County, Maryland

FIGURE 3-D
SOILS, NHD, NWI, FEMA MAP

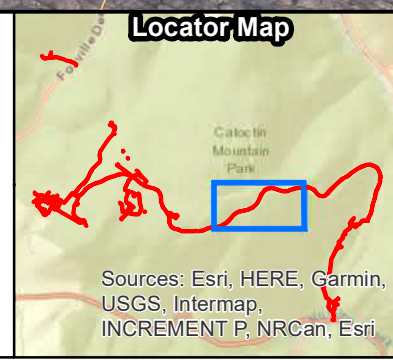
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REVIEWED BY: DS	



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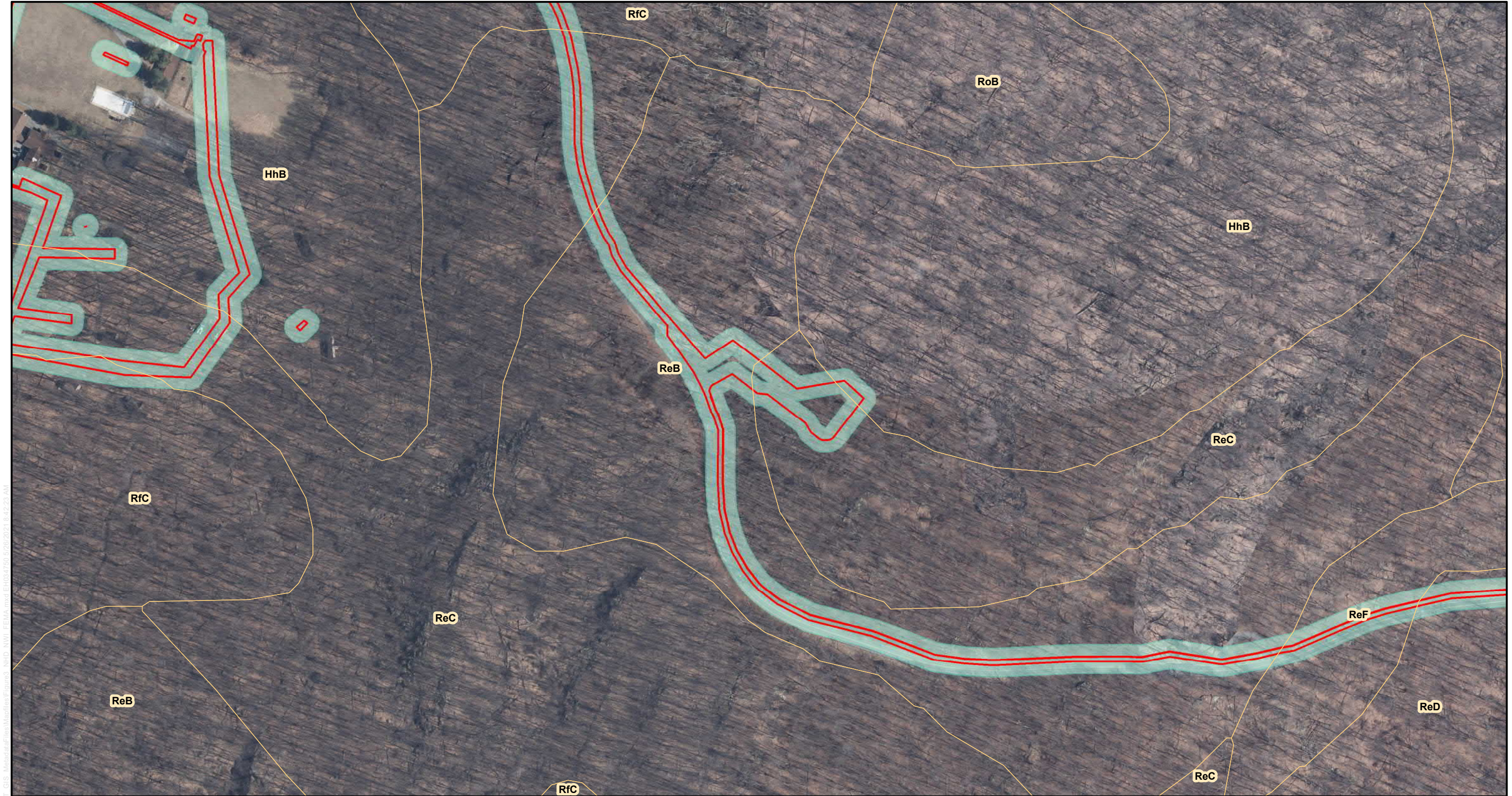
- Stream(NHD)
- Project Limits
- Soil Unit
- Wetland (NWI)
- 100yr Floodplain
- Study Area



BASE MAP SOURCE:
AERIAL IMAGERY LAYER, 2014
STREAMS - USGS, NATIONAL HYDROGRAPHY DATASET (NHD),
NATIONAL WETLAND INVENTORY (NWI)
SOILS - USDA, SSURGO DATA

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FEET

	Replace Parkwide Utility Infrastructure, Catoclin Mountain Park, Frederick County, Maryland
FIGURE 3-E SOILS, NHD, NWI, FEMA MAP	
PN: D3167628	Date: 5/26/2021
CREATED BY: RED	
REVIEWED BY: DS	



LEGEND:

Stream(NHD)

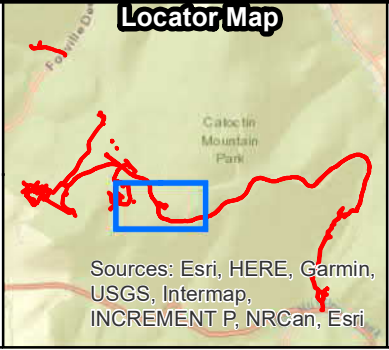
Project Limits

Soil Unit

Wetland (NWI)

100yr Floodplain

Study Area



BASE MAP SOURCE:
AERIAL IMAGERY LAYER, 2014
STREAMS - USGS, NATIONAL HYDROGRAPHY DATASET (NHD),
NATIONAL WETLAND INVENTORY (NWI)
SOILS - USDA, SSURGO DATA

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FEET

Replace Parkwide Utility Infrastructure,
Catoctin Mountain Park,
Frederick County, Maryland

FIGURE 3-F
SOILS, NHD, NWI, FEMA MAP

PN: D3167628

CREATED BY: RED

REVIEWED BY: DS

Date: 5/26/2021

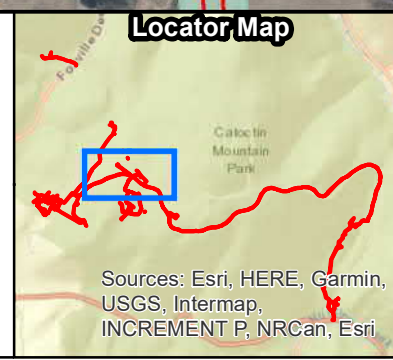
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LEGEND:

- Stream(NHD)
- Project Limits
- Soil Unit
- Wetland (NWI)
- 100yr Floodplain
- Study Area



BASE MAP SOURCE:
AERIAL IMAGERY LAYER, 2014
STREAMS - USGS, NATIONAL HYDROGRAPHY DATASET (NHD),
NATIONAL WETLAND INVENTORY (NWI)
SOILS - USDA, SSURGO DATA

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FEET

	Replace Parkwide Utility Infrastructure, Catoctin Mountain Park, Frederick County, Maryland
FIGURE 3-G SOILS, NHD, NWI, FEMA MAP	
PN: D3167628	Date: 5/26/2021
CREATED BY: RED	
REVIEWED BY: DS	



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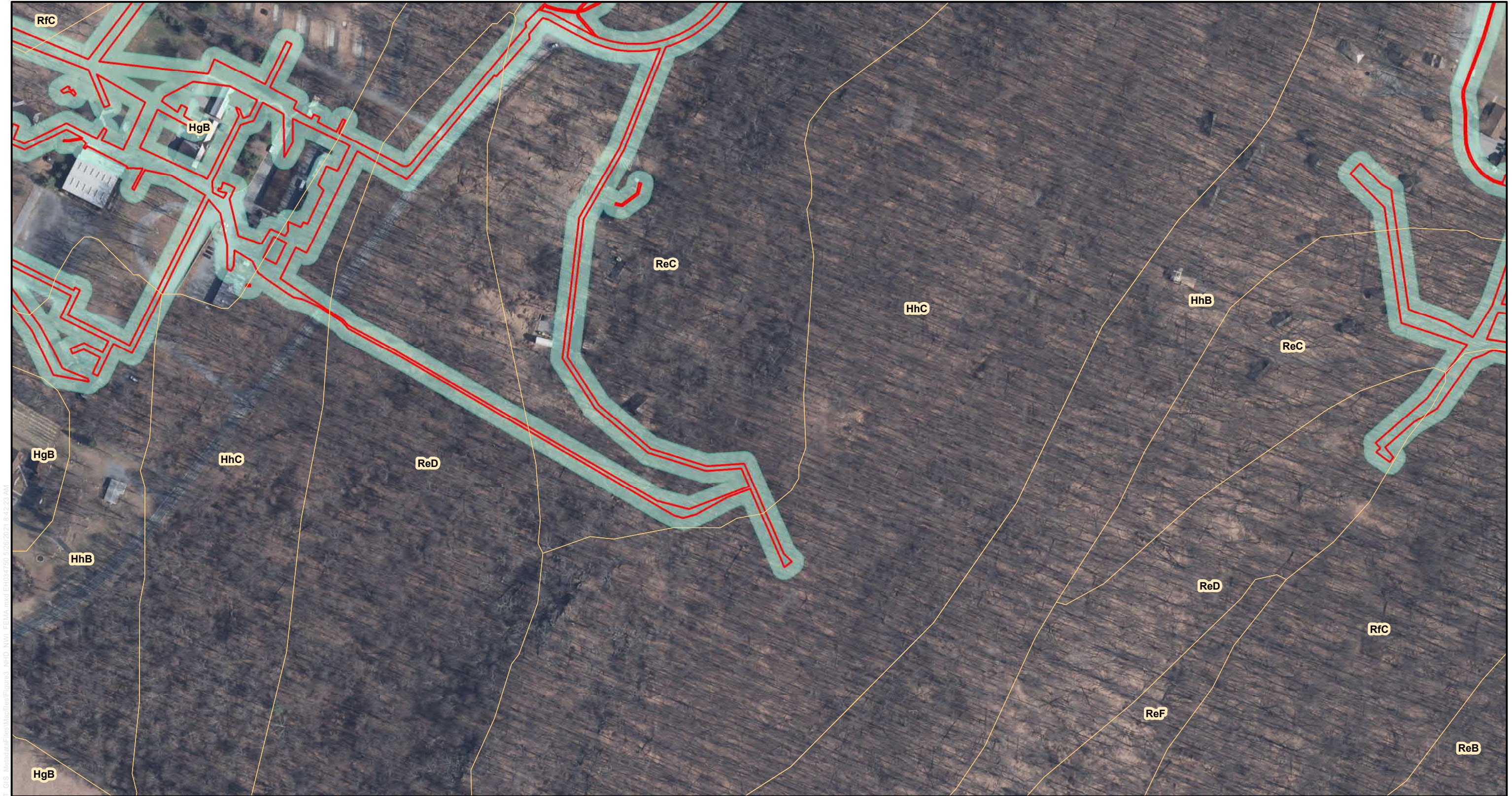
- Stream(NHD)
- Project Limits
- Soil Unit
- Wetland (NWI)
- 100yr Floodplain
- Study Area



BASE MAP SOURCE:
AERIAL IMAGERY LAYER, 2014
STREAMS - USGS, NATIONAL HYDROGRAPHY DATASET (NHD),
NATIONAL WETLAND INVENTORY (NWI)
SOILS - USDA, SSURGO DATA

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FEET

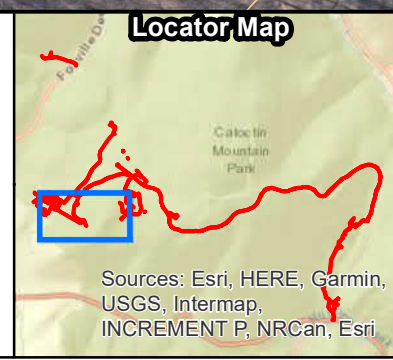
	Replace Parkwide Utility Infrastructure, Catoclin Mountain Park, Frederick County, Maryland
FIGURE 3-H SOILS, NHD, NWI, FEMA MAP	
PN: D3167628	Date: 5/26/2021
CREATED BY: RED	
REVIEWED BY: DS	



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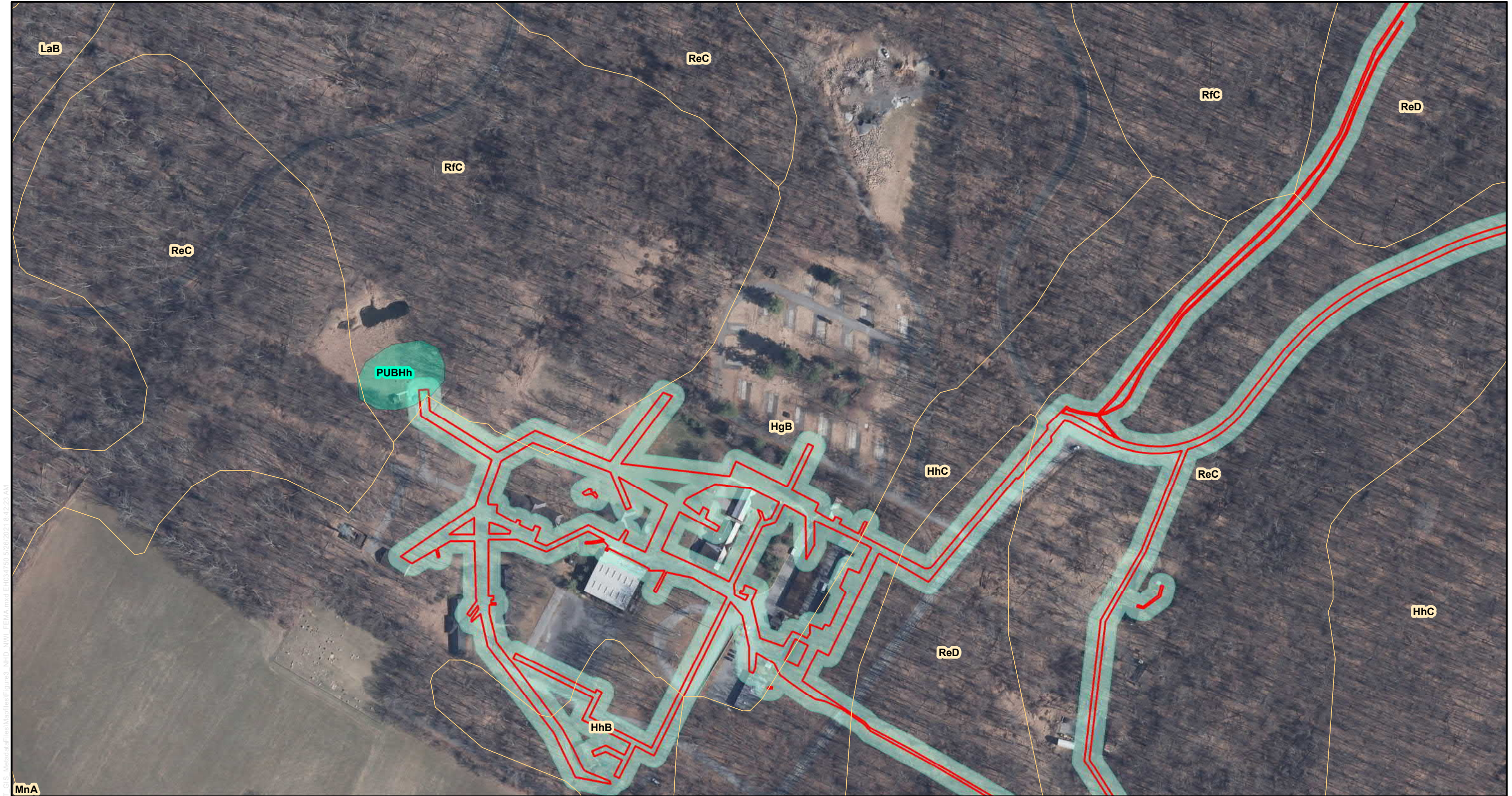
- Stream(NHD)
- Project Limits
- Soil Unit
- Wetland (NWI)
- 100yr Floodplain
- Study Area



BASE MAP SOURCE:
AERIAL IMAGERY LAYER, 2014
STREAMS - USGS, NATIONAL HYDROGRAPHY DATASET (NHD),
NATIONAL WETLAND INVENTORY (NWI)
SOILS - USDA, SSURGO DATA

0 100 200 400
FEET

	Replace Parkwide Utility Infrastructure, Catoclin Mountain Park, Frederick County, Maryland
FIGURE 3-I SOILS, NHD, NWI, FEMA MAP	
PN: D3167628	Date: 5/26/2021
CREATED BY: RED	
REVIEWED BY: DS	



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LEGEND:

- Stream(NHD)
- Project Limits
- Soil Unit
- Wetland (NWI)
- 100yr Floodplain
- Study Area

Locator Map

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri

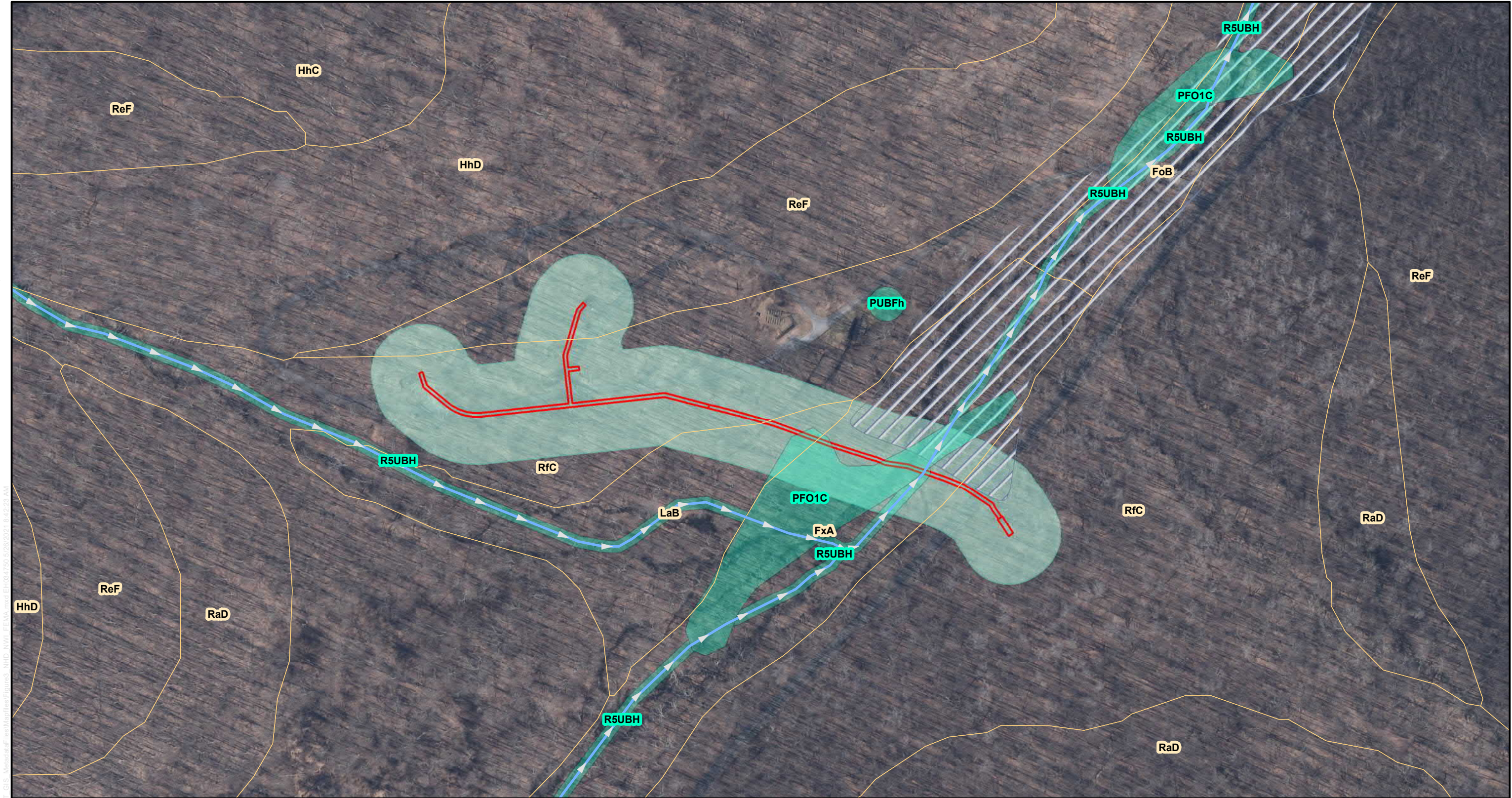
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AERIAL IMAGERY LAYER, 2014
STREAMS - USGS, NATIONAL HYDROGRAPHY DATASET (NHD),
NATIONAL WETLAND INVENTORY (NWI)
SOILS - USDA, SSURGO DATA

0 100 200 400
FEET

Replace Parkwide Utility Infrastructure,
Catoctin Mountain Park,
Frederick County, Maryland

FIGURE 3-J
SOILS, NHD, NWI, FEMA MAP

PN: D3167628	Date: 5/26/2021
CREATED BY: RED	Jacobs
REVIEWED BY: DS	



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LEGEND:

- Stream(NHD)
- Project Limits
- Soil Unit
- Wetland (NWI)
- 100yr Floodplain
- Study Area



BASE MAP SOURCE:
AERIAL IMAGERY LAYER, 2014
STREAMS - USGS, NATIONAL HYDROGRAPHY DATASET (NHD),
NATIONAL WETLAND INVENTORY (NWI)
SOILS - USDA, SSURGO DATA

0 100 200 400
FEET

		Replace Parkwide Utility Infrastructure, Catoclin Mountain Park, Frederick County, Maryland	
FIGURE 3-K SOILS, NHD, NWI, FEMA MAP			
PN: D3167628		Date: 5/26/2021	
CREATED BY: RED			
REVIEWED BY: DS			







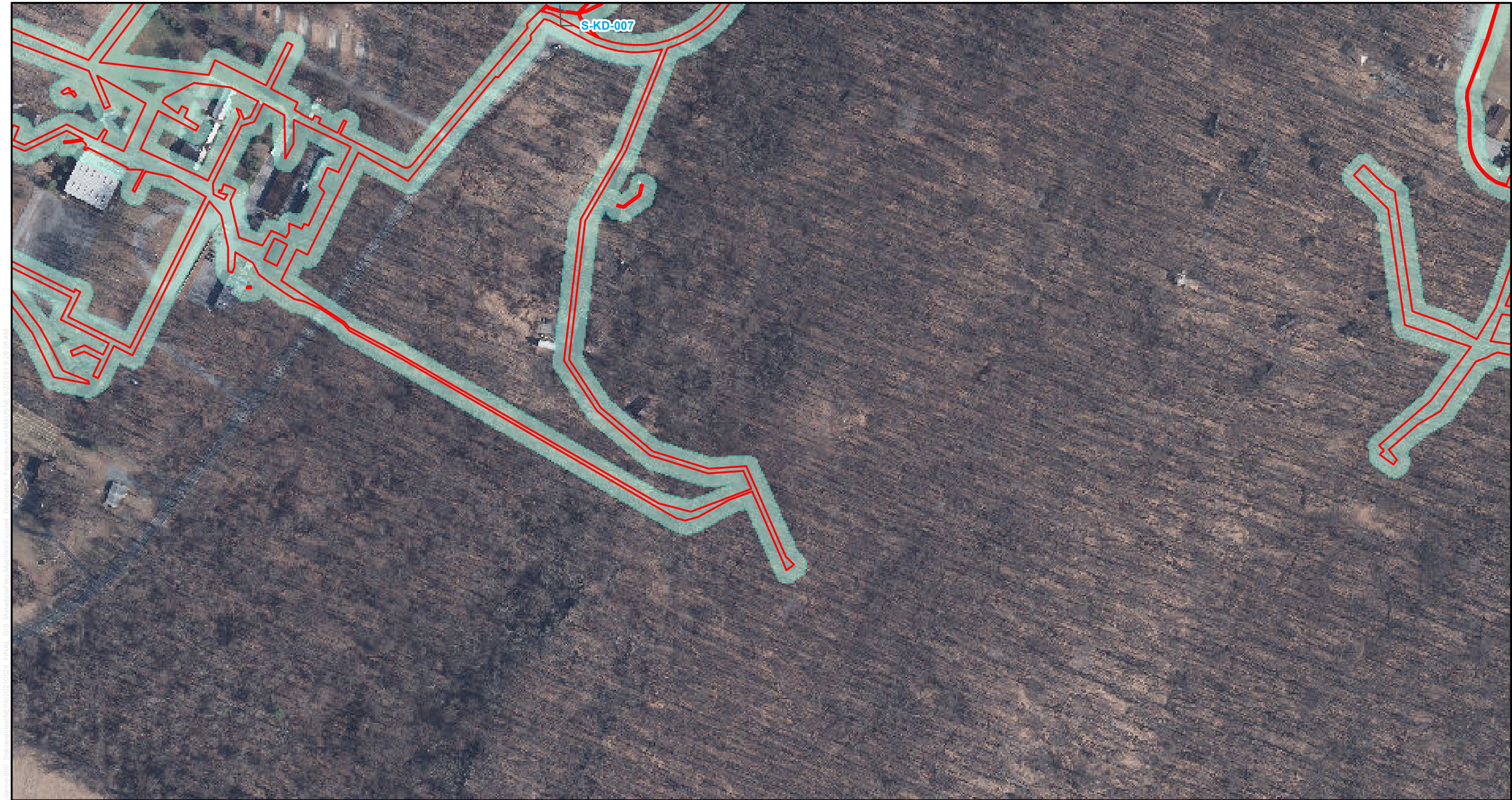








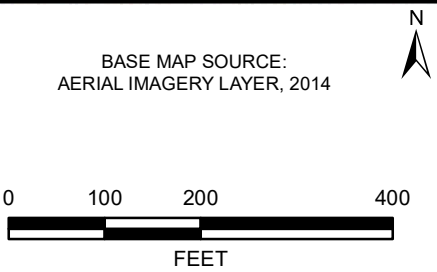
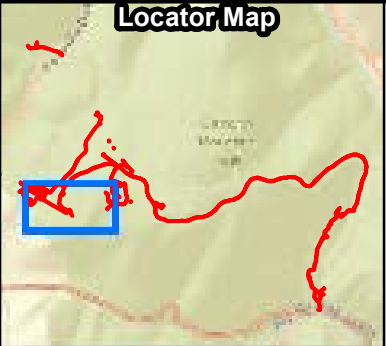





\\oriont\proj\NationalParkService\CATO-250011_Compliance\800_Deliverables\NEPA\20210526_FINAL_GIS_MetadataFiles\Mapfiles\Figured_Delineated_Features.mxd MAUSNE 6/2/2021 9:29:28 AM

LEGEND:

- Wetland Data Point
- Upland Data Point
- Project Limits
- Delineated Wetland
- Delineated Stream
- Study



	Replace Parkwide Utility Infrastructure, Catoctin Mountain Park, Frederick County, Maryland
FIGURE 4-I PRELIMINARY JURISDICTION DELINEATED FEATURES	
PN: D3167628	Date: 6/3/2021
CREATED BY: RED	Jacobs
REVIEWED BY: DS	







Appendix A – Photographs



Replace Parkwide Utility Infrastructure, Catoctin Mountain Park, Frederick County, Maryland
CATO-250011

PHOTO NO.	CAMERA ID
1	KD
SITE NAME	
S-KD-001-DS	
DIRECTION	DATE
W	12/14/2020
COORDINATES	
39° 38' 22"N, 77° 26' 59" W	
DESCRIPTION: Downstream	

PHOTO NO.	CAMERA ID
2	KD
SITE NAME	
S-KD-001-UP	
DIRECTION	DATE
SE	12/14/20
COORDINATES	
39° 38' 22"N, 77° 27' 0"W	
DESCRIPTION: Upstream	





PHOTO NO.	CAMERA ID
5	KD
SITE NAME	
S-KD-003	
DIRECTION	DATE
SW	12/14/20
COORDINATES	
39° 38' 7"N, 77° 27' 3"W	
DESCRIPTION: Downstream	

North East Elevation

225°SW (T) 39°38'7"N, 77°27'3"W ±13ft

SKD-003
14 Dec 2020 10:28:04
Downstream
Your Watermark See Settings

PHOTO NO.	CAMERA ID
6	KD
SITE NAME	
S-KD-003	
DIRECTION	DATE
NE	12/14/20
COORDINATES	
39° 38' 7"N, 77° 27' 3"W	
DESCRIPTION: Upstream	

South West Elevation

37°NE (T) 39°38'7"N, 77°27'3"W ±13ft

SKD-003
14 Dec 2020 10:28:42
Upstream
Your Watermark See Settings



PHOTO NO.	CAMERA ID
7	KD
SITE NAME	
S-KD-004	
DIRECTION	DATE
SE	12/14/20
COORDINATES	
39° 38' 35"N, 77° 26' 47"W	
DESCRIPTION: Downstream	

North West Elevation

156°SE (T) 39°38'35"N, 77°26'47"W ±52ft

Downstream
Your Watermark - See Settings

SKD-004
11/34/37
14 Dec 2020, 11:33:45

PHOTO NO.	CAMERA ID
8	KD
SITE NAME	
S-KD-004	
DIRECTION	DATE
NW	12/14/20
COORDINATES	
39° 38' 35"N, 77° 26' 46"W	
DESCRIPTION: Upstream	

South East Elevation

331°NW (T) 39°38'35"N, 77°26'46"W ±13ft

Upstream
Your Watermark - See Settings

SKD-004
11/34/37
14 Dec 2020, 11:34:37



PHOTO NO.	CAMERA ID
9	KD
SITE NAME	
S-KD-005	
DIRECTION	DATE
NE	12/14/20
COORDINATES	
39° 39' 31"N, 77° 29' 2"W	
DESCRIPTION: Downstream	

South West Elevation
37°NE (T) ● 39°39'31"N, 77°29'2"W ±55ft

SKD-005
14 Dec 2020, 15:55:22
Downstream
Your Watermark - See Settings

PHOTO NO.	CAMERA ID
10	KD
SITE NAME	
S-KD-005	
DIRECTION	DATE
SW	12/14/20
COORDINATES	
39° 39' 31"N, 77° 29' 2"W	
DESCRIPTION: Upstream	

North East Elevation
224°SW (T) ● 39°39'31"N, 77°29'2"W ±13ft

SKD-005
14 Dec 2020, 15:56:15
Upstream
Your Watermark - See Settings



Replace Parkwide Utility Infrastructure, Catocin Mountain Park, Frederick County, Maryland
CATO-250011

PHOTO NO.	CAMERA ID
11	KD
SITE NAME	
S-KD-006	
DIRECTION	DATE
SW	12/14/20
COORDINATES	
39° 39' 30"N, 77° 29' 1"W	
DESCRIPTION: Upstream	

North East Elevation
235°SW (T) ● 39°39'30"N, 77°29'1"W ±68ft

SKD-006
14 Dec 2020, 16:33:41
Upstream
Your Watermark - See Settings

PHOTO NO.	CAMERA ID
12	KD
SITE NAME	
S-KD-006	
DIRECTION	DATE
NE	12/14/20
COORDINATES	
39° 38' 30"N, 77° 29' 1"W	
DESCRIPTION: Downstream	

South West Elevation
39°NE (T) ● 39°39'30"N, 77°29'1"W ±13ft

SKD-006
14 Dec 2020, 16:34:08
Downstream
Your Watermark - See Settings



PHOTO NO.	CAMERA ID
13	KD
SITE NAME	
S-KD-007	
DIRECTION	DATE
NW	12/15/20
COORDINATES	
39° 38' 44"N, 77° 29' 1"W	
DESCRIPTION: Downstream	



PHOTO NO.	CAMERA ID
14	KD
SITE NAME	
S-KD-007	
DIRECTION	DATE
SE	12/15/20
COORDINATES	
39° 38' 45"N, 77° 29' 1"W	
DESCRIPTION: Upstream	





PHOTO NO.	CAMERA ID
15	KD
SITE NAME	
S-KD-008	
DIRECTION	DATE
E	01/07/21
COORDINATES	
39° 38' 46"N, 77° 28' 23"W	
DESCRIPTION: Downstream	



PHOTO NO.	CAMERA ID
16	KD
SITE NAME	
S-KD-008	
DIRECTION	DATE
S	01/07/21
COORDINATES	
39° 38' 46"N, 77° 28' 22"W	
DESCRIPTION: Upstream	





PHOTO NO.	CAMERA ID
17	KD
SITE NAME	
S-KD-009	
DIRECTION	DATE
NE	01/07/21
COORDINATES	
39° 38' 45"N, 77° 27' 33"W	
DESCRIPTION: Downstream	



PHOTO NO.	CAMERA ID
18	KD
SITE NAME	
S-KD-009	
DIRECTION	DATE
SW	01/07/21
COORDINATES	
39° 38' 45"N, 77° 27' 33"W	
DESCRIPTION: Upstream	





Replace Parkwide Utility Infrastructure, Catocin Mountain Park, Frederick County, Maryland
CATO-250011

PHOTO NO.	CAMERA ID
19	KD
SITE NAME	
S-KD-010	
DIRECTION	DATE
S	01/07/21
COORDINATES	
39° 38' 9"N, 77° 27' 5"W	
DESCRIPTION: Downstream	

North Elevation

☼ 179°S (T) ● 39°38'9"N, 77°27'5"W ±82ft

S-KD-010 downstream
Your Watermark - See Settings

Catocin Visitor Center
08 Jan 2021, 15:15:00

PHOTO NO.	CAMERA ID
19	KD
SITE NAME	
S-KD-010	
DIRECTION	DATE
NW	01/07/21
COORDINATES	
39° 38' 9"N, 77° 27' 4"W	
DESCRIPTION: Upstream	

South East Elevation

☼ 331°NW (T) ● 39°38'9"N, 77°27'4"W ±55ft

S-KD-010 upstream
Your Watermark - See Settings

Catocin Visitors Center
08 Jan 2021, 15:15:40



Appendix B – Wetland Determination Data Forms

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Catoctin Mountain Park City/County: Frederick County Sampling Date: 12/14/2020
 Applicant/Owner: NPS State: MD Sampling Point: W-KD-001-WET
 Investigator(s): KD, RW Section, Township, Range: not applicable
 Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 1
 Subregion (LRR or MLRA): LRR N Lat: 39.64330 Long: -77.44630 Datum: WGS 84
 Soil Map Unit Name: RfC: Ravenrock-Rohrersville complex, 3 to 5 percent slopes, extremely stony NWI classification: NA
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation ✓, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Hydric Soil Present? Yes <u>X</u> No _____	
Wetland Hydrology Present? Yes <u>X</u> No _____	
Remarks: Wintertime delineations with limited plants in herbaceous layer. During growing season anticipated that vegetated cover of <i>Symplocarpus foetidus</i> alone will pass dominance test of greater than 50%.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) <input checked="" type="checkbox"/> Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)		<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input checked="" type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input checked="" type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ - Water Table Present? Yes <u>X</u> No _____ Depth (inches): <u>8.00</u> Saturation Present? Yes <u>X</u> No _____ Depth (inches): <u>6.00</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <u>X</u> No _____	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks: Snow and rain mix		

VEGETATION (Five Strata) – Use scientific names of plants.

Sampling Point: W-KD-001-WET

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:														
1. <i>Fagus grandifolia</i>	25	Y	FACU	Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>50.00</u> (A/B)														
2. <i>Carpinus caroliniana</i>	5	N	FAC															
3. _____	_____	_____	_____															
4. _____	_____	_____	_____															
5. _____	_____	_____	_____															
6. _____	_____	_____	_____															
30 = Total Cover				Prevalence Index worksheet: <table style="width: 100%;"> <tr> <th style="width: 50%;">Total % Cover of:</th> <th style="width: 50%;">Multiply by:</th> </tr> <tr> <td>OBL species <u>5</u></td> <td>x 1 = <u>5</u></td> </tr> <tr> <td>FACW species <u>0</u></td> <td>x 2 = <u>0</u></td> </tr> <tr> <td>FAC species <u>5</u></td> <td>x 3 = <u>15</u></td> </tr> <tr> <td>FACU species <u>25</u></td> <td>x 4 = <u>100</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>35</u> (A)</td> <td><u>120</u> (B)</td> </tr> </table> Prevalence Index = B/A = <u>3.43</u>	Total % Cover of:	Multiply by:	OBL species <u>5</u>	x 1 = <u>5</u>	FACW species <u>0</u>	x 2 = <u>0</u>	FAC species <u>5</u>	x 3 = <u>15</u>	FACU species <u>25</u>	x 4 = <u>100</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>35</u> (A)	<u>120</u> (B)
Total % Cover of:	Multiply by:																	
OBL species <u>5</u>	x 1 = <u>5</u>																	
FACW species <u>0</u>	x 2 = <u>0</u>																	
FAC species <u>5</u>	x 3 = <u>15</u>																	
FACU species <u>25</u>	x 4 = <u>100</u>																	
UPL species <u>0</u>	x 5 = <u>0</u>																	
Column Totals: <u>35</u> (A)	<u>120</u> (B)																	
50% of total cover: <u>15</u> 20% of total cover: <u>6</u>																		
Sapling Stratum (Plot size: 15')																		
1. _____	_____	_____	_____															
2. _____	_____	_____	_____															
3. _____	_____	_____	_____															
4. _____	_____	_____	_____															
5. _____	_____	_____	_____															
6. _____	_____	_____	_____															
0 = Total Cover																		
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>																		
Shrub Stratum (Plot size: 15')																		
1. _____	_____	_____	_____															
2. _____	_____	_____	_____															
3. _____	_____	_____	_____															
4. _____	_____	_____	_____															
5. _____	_____	_____	_____															
6. _____	_____	_____	_____															
0 = Total Cover																		
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>																		
Herb Stratum (Plot size: 5')																		
1. <i>Symplocarpus foetidus</i>	5	Y	OBL															
2. _____	_____	_____	_____															
3. _____	_____	_____	_____															
4. _____	_____	_____	_____															
5. _____	_____	_____	_____															
6. _____	_____	_____	_____															
7. _____	_____	_____	_____															
8. _____	_____	_____	_____															
9. _____	_____	_____	_____															
10. _____	_____	_____	_____															
11. _____	_____	_____	_____															
5 = Total Cover																		
50% of total cover: <u>3</u> 20% of total cover: <u>1</u>																		
Woody Vine Stratum (Plot size: 30')																		
1. _____	_____	_____	_____															
2. _____	_____	_____	_____															
3. _____	_____	_____	_____															
4. _____	_____	_____	_____															
5. _____	_____	_____	_____															
0 = Total Cover																		
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>																		
Hydrophytic Vegetation Present? Yes <u>X</u> No _____																		

Remarks: (Include photo numbers here or on a separate sheet.)
 Wintertime delineations with limited plants in herbaceous layer. During growing season anticipated that vegetated cover of *Symplocarpus foetidus* alone will pass dominance test of greater than 50%. *Fagus grandifolia* naturally problematic but exists in wetlands.

SOIL

Sampling Point: W-KD-001 **Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0 — 16	10YR 3/1	93	5YR 5/8	7	C	PL	Silty loam	
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.²Location: PL=Pore Lining, M=Matrix.**Hydric Soil Indicators:**

- ☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ 2 cm Muck (A10) (**LRR N**)
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Sandy Mucky Mineral (S1) (**LRR N, MLRA 147, 148**)
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)

- ☐ Dark Surface (S7)
☐ Polyvalue Below Surface (S8) (**MLRA 147, 148**)
☐ Thin Dark Surface (S9) (**MLRA 147, 148**)
☐ Loamy Gleyed Matrix (F2)
☒ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Iron-Manganese Masses (F12) (**LRR N, MLRA 136**)
☐ Umbric Surface (F13) (**MLRA 136, 122**)
☐ Piedmont Floodplain Soils (F19) (**MLRA 148**)
☐ Red Parent Material (F21) (**MLRA 127, 147**)

Indicators for Problematic Hydric Soils³:

- ☐ 2 cm Muck (A10) (**MLRA 147**)
☐ Coast Prairie Redox (A16) (**MLRA 147, 148**)
☐ Piedmont Floodplain Soils (F19) (**MLRA 136, 147**)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.**Restrictive Layer (if observed):** No

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No

Remarks:



W-KD-001 facing south



W-KD-001 facing north

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Catoctin Mountain Park City/County: Frederick Sampling Date: 12/14/2020
 Applicant/Owner: NPS State: MD Sampling Point: W-KD-001-L
 Investigator(s): KD, RW Section, Township, Range: not applicable
 Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): Flat Slope (%): 1
 Subregion (LRR or MLRA): LRR N Lat: 39.64334 Long: -77.44632 Datum: WGS 84
 Soil Map Unit Name: RfC: Ravenrock-Rohrersville complex, 3 to 15 percent slopes, extremely stony NWI classification: NA
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
 Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No
 Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u> </u> No <u>X</u>	Is the Sampled Area within a Wetland? Yes <u> </u> No <u>X</u>
Hydric Soil Present? Yes <u> </u> No <u>X</u>	
Wetland Hydrology Present? Yes <u> </u> No <u>X</u>	
Remarks:	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)		<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes <u> </u> No <u>X</u> Depth (inches): <u> </u> Water Table Present? Yes <u> </u> No <u>X</u> Depth (inches): <u> </u> Saturation Present? Yes <u> </u> No <u>X</u> Depth (inches): <u> </u> (includes capillary fringe)	Wetland Hydrology Present? Yes <u> </u> No <u>X</u>	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		
No positive hydrology indicators observed		

VEGETATION (Five Strata) – Use scientific names of plants.

 Sampling Point: W-KD-001-UP

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status															
1. <u>Fagus grandifolia</u>	80	Y	FACU	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0.00</u> (A/B)														
2. <u>Quercus alba</u>	25	Y	FACU															
3. _____																		
4. _____																		
5. _____																		
6. _____																		
<u>105</u> = Total Cover				Prevalence Index worksheet: <table style="width: 100%;"> <tr> <th style="width: 50%;">Total % Cover of:</th> <th style="width: 50%;">Multiply by:</th> </tr> <tr> <td>OBL species <u>0</u></td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species <u>0</u></td> <td>x 2 = <u>0</u></td> </tr> <tr> <td>FAC species <u>0</u></td> <td>x 3 = <u>0</u></td> </tr> <tr> <td>FACU species <u>105</u></td> <td>x 4 = <u>420</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>105</u> (A)</td> <td><u>420</u> (B)</td> </tr> </table> Prevalence Index = B/A = <u>4.00</u>	Total % Cover of:	Multiply by:	OBL species <u>0</u>	x 1 = <u>0</u>	FACW species <u>0</u>	x 2 = <u>0</u>	FAC species <u>0</u>	x 3 = <u>0</u>	FACU species <u>105</u>	x 4 = <u>420</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>105</u> (A)	<u>420</u> (B)
Total % Cover of:	Multiply by:																	
OBL species <u>0</u>	x 1 = <u>0</u>																	
FACW species <u>0</u>	x 2 = <u>0</u>																	
FAC species <u>0</u>	x 3 = <u>0</u>																	
FACU species <u>105</u>	x 4 = <u>420</u>																	
UPL species <u>0</u>	x 5 = <u>0</u>																	
Column Totals: <u>105</u> (A)	<u>420</u> (B)																	
50% of total cover: <u>53</u> 20% of total cover: <u>21</u>																		
Sapling Stratum (Plot size: <u>15'</u>)																		
1. _____				Hydrophytic Vegetation Indicators: <u> </u> 1 - Rapid Test for Hydrophytic Vegetation <u> </u> 2 - Dominance Test is >50% <u> </u> 3 - Prevalence Index is ≤3.0 ¹ <u> </u> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <u> </u> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.														
2. _____																		
3. _____																		
4. _____																		
5. _____																		
6. _____																		
<u>0</u> = Total Cover																		
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>																		
Shrub Stratum (Plot size: <u>15'</u>)																		
1. _____																		
2. _____																		
3. _____																		
4. _____																		
5. _____																		
6. _____																		
<u>0</u> = Total Cover																		
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>																		
Herb Stratum (Plot size: <u>5'</u>)																		
1. _____				Definitions of Five Vegetation Strata: Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH). Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height. Woody vine – All woody vines, regardless of height.														
2. _____																		
3. _____																		
4. _____																		
5. _____																		
6. _____																		
7. _____																		
8. _____																		
9. _____																		
10. _____																		
11. _____																		
<u>0</u> = Total Cover																		
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>																		
Woody Vine Stratum (Plot size: <u>30'</u>)																		
1. _____				Hydrophytic Vegetation Present? Yes <u> </u> No <u>X</u>														
2. _____																		
3. _____																		
4. _____																		
5. _____																		
<u>0</u> = Total Cover																		
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>																		

Remarks: (Include photo numbers here or on a separate sheet.)
 Winter delineation. No plants in the herb stratum.

SOIL

Sampling Point: W-KD-001-UP

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0 — 5	10YR 2/2	100					Silty loam	
5 — 10	2.5Y 3/3	100					Silty loam	
—								
—								
—								
—								
—								
—								
—								
—								
—								

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (**LRR N**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1) (**LRR N, MLRA 147, 148**)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)

- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) (**MLRA 147, 148**)
- ☐ Thin Dark Surface (S9) (**MLRA 147, 148**)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (**LRR N, MLRA 136**)
- ☐ Umbric Surface (F13) (**MLRA 136, 122**)
- ☐ Piedmont Floodplain Soils (F19) (**MLRA 148**)
- ☐ Red Parent Material (F21) (**MLRA 127, 147**)

Indicators for Problematic Hydric Soils³:

- ☐ 2 cm Muck (A10) (**MLRA 147**)
- ☐ Coast Prairie Redox (A16) (**MLRA 147, 148**)
- ☐ Piedmont Floodplain Soils (F19) (**MLRA 136, 147**)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): No

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

No positive hydric soil indicators observed



View of upland facing north



View of upland facing south

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Catoctin Mountain Park City/County: Frederick County Sampling Date: 12/15/2020
Applicant/Owner: NPS State: MD Sampling Point: W-KD-002
Investigator(s): KD, RW Section, Township, Range: not applicable
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 1
Subregion (LRR or MLRA): LRR N Lat: 39.65863 Long: -77.48376 Datum: WGS 84
Soil Map Unit Name: FxA: Foxville and Hatboro soils, 0 to 3 percent slopes NWI classification: PFO1C
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
Are Vegetation ✓, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No _____ Hydric Soil Present? Yes <u>X</u> No _____ Wetland Hydrology Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Remarks: Wintertime delineations with limited plants in herbaceous layer. During growing season it is anticipated that vegetated cover of <i>Symplocarpus foetidus</i> (alone) will pass dominance test of greater than 50%.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)		<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input checked="" type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input checked="" type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input checked="" type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes _____ No <u>X</u> Depth (inches): _____ Saturation Present? Yes _____ No <u>X</u> Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes <u>X</u> No _____	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks: Wetland hydrology confirmed by secondary indicators.		

VEGETATION (Five Strata) – Use scientific names of plants.

 Sampling Point: W-KD-002

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status															
1. <u>Acer saccharum</u>	5	N	FACU	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>6</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>50.00</u> (A/B)														
2. <u>Liriodendron tulipifera</u>	30	Y	FACU															
3. _____																		
4. _____																		
5. _____																		
6. _____																		
<u>35</u> = Total Cover				Prevalence Index worksheet: <table style="width: 100%;"> <tr> <th style="text-align: left;">Total % Cover of:</th> <th style="text-align: left;">Multiply by:</th> </tr> <tr> <td>OBL species <u>15</u></td> <td>x 1 = <u>15</u></td> </tr> <tr> <td>FACW species <u>20</u></td> <td>x 2 = <u>40</u></td> </tr> <tr> <td>FAC species <u>10</u></td> <td>x 3 = <u>30</u></td> </tr> <tr> <td>FACU species <u>65</u></td> <td>x 4 = <u>260</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>110</u> (A)</td> <td><u>345</u> (B)</td> </tr> </table> Prevalence Index = B/A = <u>3.14</u>	Total % Cover of:	Multiply by:	OBL species <u>15</u>	x 1 = <u>15</u>	FACW species <u>20</u>	x 2 = <u>40</u>	FAC species <u>10</u>	x 3 = <u>30</u>	FACU species <u>65</u>	x 4 = <u>260</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>110</u> (A)	<u>345</u> (B)
Total % Cover of:	Multiply by:																	
OBL species <u>15</u>	x 1 = <u>15</u>																	
FACW species <u>20</u>	x 2 = <u>40</u>																	
FAC species <u>10</u>	x 3 = <u>30</u>																	
FACU species <u>65</u>	x 4 = <u>260</u>																	
UPL species <u>0</u>	x 5 = <u>0</u>																	
Column Totals: <u>110</u> (A)	<u>345</u> (B)																	
50% of total cover: <u>18</u> 20% of total cover: <u>7</u>																		
Sapling Stratum (Plot size: <u>15'</u>)																		
1. _____																		
2. _____																		
3. _____																		
4. _____																		
5. _____																		
6. _____																		
<u>10</u> = Total Cover																		
50% of total cover: <u>5</u> 20% of total cover: <u>2</u>																		
Shrub Stratum (Plot size: <u>15'</u>)																		
1. <u>Hamamelis virginiana</u>	15	Y	FACU	Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input checked="" type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)														
2. <u>Berberis thunbergii</u>	15	Y	FACU															
3. _____																		
4. _____																		
5. _____																		
6. _____																		
<u>30</u> = Total Cover																		
50% of total cover: <u>15</u> 20% of total cover: <u>6</u>																		
Herb Stratum (Plot size: <u>5'</u>)																		
1. <u>Symplocarpus foetidus</u>	15	Y	OBL	Definitions of Five Vegetation Strata: Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH). Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height. Woody vine – All woody vines, regardless of height.														
2. <u>Impatiens capensis</u>	20	Y	FACW															
3. _____																		
4. _____																		
5. _____																		
6. _____																		
7. _____																		
8. _____																		
9. _____																		
10. _____																		
11. _____																		
<u>35</u> = Total Cover																		
50% of total cover: <u>18</u> 20% of total cover: <u>7</u>																		
Woody Vine Stratum (Plot size: <u>30'</u>)																		
1. _____																		
2. _____																		
3. _____																		
4. _____																		
5. _____																		
<u>0</u> = Total Cover																		
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>																		
Remarks: (Include photo numbers here or on a separate sheet.) Problematic hydric vegetation due to limited herbaceous layer in wintertime and FACU forested wetland. During growing season it is anticipated that vegetated cover of <i>Symplocarpus foetidus</i> (alone) will pass dominance test of greater than 50%.																		

Hydrophytic Vegetation Present?	Yes <u>X</u>	No _____
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SOIL

Sampling Point: W-KD-002

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0 — 6	10YR 2/2	100					Fine loam	
6 — 10	10YR 4/2	95	7.5YR 3/4	5	C	M	Fine loam	
—								
—								
—								
—								
—								
—								
—								
—								
—								

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ 2 cm Muck (A10) (**LRR N**)
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Sandy Mucky Mineral (S1) (**LRR N, MLRA 147, 148**)
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)

- ☐ Dark Surface (S7)
☐ Polyvalue Below Surface (S8) (**MLRA 147, 148**)
☐ Thin Dark Surface (S9) (**MLRA 147, 148**)
☐ Loamy Gleyed Matrix (F2)
☒ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Iron-Manganese Masses (F12) (**LRR N, MLRA 136**)
☐ Umbric Surface (F13) (**MLRA 136, 122**)
☐ Piedmont Floodplain Soils (F19) (**MLRA 148**)
☐ Red Parent Material (F21) (**MLRA 127, 147**)

Indicators for Problematic Hydric Soils³:

- ☐ 2 cm Muck (A10) (**MLRA 147**)
☐ Coast Prairie Redox (A16) (**MLRA 147, 148**)
☐ Piedmont Floodplain Soils (F19) (**MLRA 136, 147**)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): No

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:



View of wetland facing north



WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Catoctin Mountain Park City/County: Frederick County Sampling Date: 12/15/2020
Applicant/Owner: NPS State: MD Sampling Point: W-KD-002_UP
Investigator(s): KD, RW Section, Township, Range: not applicable
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 1
Subregion (LRR or MLRA): LRR - N Lat: 39.65848 Long: -77.48382 Datum: WGS 84
Soil Map Unit Name: RfC: Ravenrock-Rohrersville complex, 3 to 15 percent slopes, extremely stony NWI classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No <u>X</u>	Is the Sampled Area within a Wetland? Yes _____ No <u>X</u>
Hydric Soil Present? Yes _____ No <u>X</u>	
Wetland Hydrology Present? Yes _____ No <u>X</u>	
Remarks: Upland reference data point	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)		<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes _____ No <u>X</u> Depth (inches): _____ Saturation Present? Yes _____ No <u>X</u> Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No <u>X</u>	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: No hydrology indicators present in reference point.		
Remarks: No positive hydrology indicators observed		

VEGETATION (Five Strata) – Use scientific names of plants.

 Sampling Point: W-KD-002_UP

<p>Tree Stratum (Plot size: <u>30'</u>)</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 40%;"></th> <th style="width: 15%; text-align: center;">Absolute % Cover</th> <th style="width: 15%; text-align: center;">Dominant Species?</th> <th style="width: 30%; text-align: center;">Indicator Status</th> </tr> </thead> <tbody> <tr><td>1. <u>Liriodendron tulipifera</u></td><td style="text-align: center;">35</td><td style="text-align: center;">Y</td><td style="text-align: center;">FACU</td></tr> <tr><td>2. <u>Fraxinus americana</u></td><td style="text-align: center;">20</td><td style="text-align: center;">Y</td><td style="text-align: center;">FACU</td></tr> <tr><td>3. _____</td><td></td><td></td><td></td></tr> <tr><td>4. _____</td><td></td><td></td><td></td></tr> <tr><td>5. _____</td><td></td><td></td><td></td></tr> <tr><td>6. _____</td><td></td><td></td><td></td></tr> <tr><td colspan="4" style="text-align: right;">55 = Total Cover</td></tr> <tr><td colspan="4">50% of total cover: <u>28</u> 20% of total cover: <u>11</u></td></tr> </tbody> </table> <p>Sapling Stratum (Plot size: <u>15'</u>)</p> <table style="width: 100%; border-collapse: collapse;"> <tbody> <tr><td>1. _____</td><td></td><td></td><td></td></tr> <tr><td>2. _____</td><td></td><td></td><td></td></tr> <tr><td>3. _____</td><td></td><td></td><td></td></tr> <tr><td>4. _____</td><td></td><td></td><td></td></tr> <tr><td>5. _____</td><td></td><td></td><td></td></tr> <tr><td>6. _____</td><td></td><td></td><td></td></tr> <tr><td colspan="4" style="text-align: right;">15 = Total Cover</td></tr> <tr><td colspan="4">50% of total cover: <u>8</u> 20% of total cover: <u>3</u></td></tr> </tbody> </table> <p>Shrub Stratum (Plot size: <u>15'</u>)</p> <table style="width: 100%; border-collapse: collapse;"> <tbody> <tr><td>1. <u>Berberis thunbergii</u></td><td style="text-align: center;">15</td><td style="text-align: center;">Y</td><td style="text-align: center;">FACU</td></tr> <tr><td>2. _____</td><td></td><td></td><td></td></tr> <tr><td>3. _____</td><td></td><td></td><td></td></tr> <tr><td>4. _____</td><td></td><td></td><td></td></tr> <tr><td>5. _____</td><td></td><td></td><td></td></tr> <tr><td>6. _____</td><td></td><td></td><td></td></tr> <tr><td colspan="4" style="text-align: right;">15 = Total Cover</td></tr> <tr><td colspan="4">50% of total cover: <u>8</u> 20% of total cover: <u>3</u></td></tr> </tbody> </table> <p>Herb Stratum (Plot size: <u>5'</u>)</p> <table style="width: 100%; border-collapse: collapse;"> <tbody> <tr><td>1. <u>Polystichum acrostichoides</u></td><td style="text-align: center;">30</td><td style="text-align: center;">Y</td><td style="text-align: center;">FACU</td></tr> <tr><td>2. _____</td><td></td><td></td><td></td></tr> <tr><td>3. _____</td><td></td><td></td><td></td></tr> <tr><td>4. _____</td><td></td><td></td><td></td></tr> <tr><td>5. _____</td><td></td><td></td><td></td></tr> <tr><td>6. _____</td><td></td><td></td><td></td></tr> <tr><td>7. _____</td><td></td><td></td><td></td></tr> <tr><td>8. _____</td><td></td><td></td><td></td></tr> <tr><td>9. _____</td><td></td><td></td><td></td></tr> <tr><td>10. _____</td><td></td><td></td><td></td></tr> <tr><td>11. _____</td><td></td><td></td><td></td></tr> <tr><td colspan="4" style="text-align: right;">30 = Total Cover</td></tr> <tr><td colspan="4">50% of total cover: <u>15</u> 20% of total cover: <u>6</u></td></tr> </tbody> </table> <p>Woody Vine Stratum (Plot size: <u>30'</u>)</p> <table style="width: 100%; border-collapse: collapse;"> <tbody> <tr><td>1. _____</td><td></td><td></td><td></td></tr> <tr><td>2. _____</td><td></td><td></td><td></td></tr> <tr><td>3. _____</td><td></td><td></td><td></td></tr> <tr><td>4. _____</td><td></td><td></td><td></td></tr> <tr><td>5. _____</td><td></td><td></td><td></td></tr> <tr><td colspan="4" style="text-align: right;">0 = Total Cover</td></tr> <tr><td colspan="4">50% of total cover: <u>0</u> 20% of total cover: <u>0</u></td></tr> </tbody> </table>		Absolute % Cover	Dominant Species?	Indicator Status	1. <u>Liriodendron tulipifera</u>	35	Y	FACU	2. <u>Fraxinus americana</u>	20	Y	FACU	3. _____				4. _____				5. _____				6. _____				55 = Total Cover				50% of total cover: <u>28</u> 20% of total cover: <u>11</u>				1. _____				2. _____				3. _____				4. _____				5. _____				6. _____				15 = Total Cover				50% of total cover: <u>8</u> 20% of total cover: <u>3</u>				1. <u>Berberis thunbergii</u>	15	Y	FACU	2. _____				3. _____				4. _____				5. _____				6. _____				15 = Total Cover				50% of total cover: <u>8</u> 20% of total cover: <u>3</u>				1. <u>Polystichum acrostichoides</u>	30	Y	FACU	2. _____				3. _____				4. _____				5. _____				6. _____				7. _____				8. _____				9. _____				10. _____				11. _____				30 = Total Cover				50% of total cover: <u>15</u> 20% of total cover: <u>6</u>				1. _____				2. _____				3. _____				4. _____				5. _____				0 = Total Cover				50% of total cover: <u>0</u> 20% of total cover: <u>0</u>				<p>Dominance Test worksheet:</p> <p>Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A)</p> <p>Total Number of Dominant Species Across All Strata: <u>5</u> (B)</p> <p>Percent of Dominant Species That Are OBL, FACW, or FAC: <u>20.00</u> (A/B)</p> <p>Prevalence Index worksheet:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 40%; text-align: left;">Total % Cover of:</th> <th style="width: 60%; text-align: left;">Multiply by:</th> </tr> </thead> <tbody> <tr><td>OBL species <u>0</u></td><td>x 1 = <u>0</u></td></tr> <tr><td>FACW species <u>0</u></td><td>x 2 = <u>0</u></td></tr> <tr><td>FAC species <u>15</u></td><td>x 3 = <u>45</u></td></tr> <tr><td>FACU species <u>100</u></td><td>x 4 = <u>400</u></td></tr> <tr><td>UPL species <u>0</u></td><td>x 5 = <u>0</u></td></tr> <tr><td>Column Totals: <u>115</u> (A)</td><td><u>445</u> (B)</td></tr> </tbody> </table> <p>Prevalence Index = B/A = <u>3.87</u></p> <p>Hydrophytic Vegetation Indicators:</p> <p><input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation</p> <p><input type="checkbox"/> 2 - Dominance Test is >50%</p> <p><input type="checkbox"/> 3 - Prevalence Index is ≤3.0¹</p> <p><input type="checkbox"/> 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)</p> <p><input type="checkbox"/> Problematic Hydrophytic Vegetation¹ (Explain)</p> <p><small>¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.</small></p> <p>Definitions of Five Vegetation Strata:</p> <p>Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).</p> <p>Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.</p> <p>Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.</p> <p>Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.</p> <p>Woody vine – All woody vines, regardless of height.</p> <p>Hydrophytic Vegetation Present? Yes <u> </u> No <u>X</u></p>	Total % Cover of:	Multiply by:	OBL species <u>0</u>	x 1 = <u>0</u>	FACW species <u>0</u>	x 2 = <u>0</u>	FAC species <u>15</u>	x 3 = <u>45</u>	FACU species <u>100</u>	x 4 = <u>400</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>115</u> (A)	<u>445</u> (B)
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SOIL

Sampling Point: W-KD-002_UP

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0 — 4	10YR 3/3	100					Silty loam	
4 — 12	10YR 4/2	100					Silty loam	
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¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ 2 cm Muck (A10) (**LRR N**)
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Sandy Mucky Mineral (S1) (**LRR N, MLRA 147, 148**)
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)

- ☐ Dark Surface (S7)
☐ Polyvalue Below Surface (S8) (**MLRA 147, 148**)
☐ Thin Dark Surface (S9) (**MLRA 147, 148**)
☐ Loamy Gleyed Matrix (F2)
☐ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Iron-Manganese Masses (F12) (**LRR N, MLRA 136**)
☐ Umbric Surface (F13) (**MLRA 136, 122**)
☐ Piedmont Floodplain Soils (F19) (**MLRA 148**)
☐ Red Parent Material (F21) (**MLRA 127, 147**)

Indicators for Problematic Hydric Soils³:

- ☐ 2 cm Muck (A10) (**MLRA 147**)
☐ Coast Prairie Redox (A16) (**MLRA 147, 148**)
☐ Piedmont Floodplain Soils (F19) (**MLRA 136, 147**)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): No

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

No positive hydric soil indicators observed



View of upland facing east



WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Catoctin Mountain Park City/County: Frederick Sampling Date: 12/15/2020
 Applicant/Owner: NPS State: MD Sampling Point: W-KD-003-WET
 Investigator(s): KD, RW, BC, LP Section, Township, Range: not applicable
 Landform (hillslope, terrace, etc.): Hillside Local relief (concave, convex, none): Concave Slope (%): 5
 Subregion (LRR or MLRA): LLR N Lat: 39.64010 Long: -77.45004 Datum: WGS 84
 Soil Map Unit Name: Ravenrock-Rohrersville complex, 3 to 15 percent slopes, extremely stony (RfC) NWI classification: N/A
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
 Are Vegetation ✓, Soil ✓, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Hydric Soil Present? Yes <u>X</u> No _____	
Wetland Hydrology Present? Yes <u>X</u> No _____	
Remarks: Area shows evidence of being disturbed (broken tile drain and other debris). Wintertime delineation outside of growing season.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input checked="" type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)		<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input checked="" type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input checked="" type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input checked="" type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes <u>X</u> No _____ Depth (inches): <u>6.00</u> Saturation Present? Yes <u>X</u> No _____ Depth (inches): <u>3.00</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <u>X</u> No _____	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks: Shallow water table. Winter time delineation. No surface water present. Hydrology confirmed by primary indicators. Found remnants of old tile drain and outlet near top of wetland area.		

VEGETATION (Five Strata) – Use scientific names of plants.

 Sampling Point: W-KD-003-WET

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status															
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<u>10</u> = Total Cover																		
50% of total cover: <u>5</u> 20% of total cover: <u>2</u>																		
Herb Stratum (Plot size: <u>5'</u>)																		
1. <u>Microstegium vimineum</u>	70	Y	FAC	Definitions of Five Vegetation Strata: Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH). Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height. Woody vine – All woody vines, regardless of height.														
2. <u>Barbarea vulgaris</u>	5	N	FACU															
3. <u>Carex sp.</u>	2	N	UNK															
4. <u>Carex sp.</u>	5	N	UNK															
5. <u>Scirpus polyphyllus</u>	15	Y	OBL															
6. _____																		
7. _____																		
8. _____																		
9. _____																		
10. _____																		
11. _____																		
<u>87</u> = Total Cover																		
50% of total cover: <u>44</u> 20% of total cover: <u>17</u>																		
Woody Vine Stratum (Plot size: <u>30'</u>)																		
1. _____																		
2. _____																		
3. _____																		
4. _____																		
5. _____																		
<u>0</u> = Total Cover																		
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>																		
Remarks: (Include photo numbers here or on a separate sheet.)																		

Winter time delineation, invasives and primarily problematic FACU vegetation. During growing season it is anticipated that vegetated cover of wetlands species will pass dominance test of greater than 50%. Multiflora rose often found to dominate in disturbed wetlands.

SOIL

Sampling Point: W-KD-003

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0 — 4	10YR 4/2	100					Silty loam	
4 — 14	2.5Y 5/2	90	7.5YR 6/6	10	D	M	Silty loam	
—								
—								
—								
—								
—								
—								
—								
—								
—								

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (LRR N)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)

- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) (MLRA 147, 148)
- ☐ Thin Dark Surface (S9) (MLRA 147, 148)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- ☐ Umbric Surface (F13) (MLRA 136, 122)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 148)
- ☐ Red Parent Material (F21) (MLRA 127, 147)

Indicators for Problematic Hydric Soils³:

- ☐ 2 cm Muck (A10) (MLRA 147)
- ☐ Coast Prairie Redox (A16) (MLRA 147, 148)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): No

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:

Soil series includes hydric inclusions of Lantz. LANTZ (15%) Mollic Endoaqualfs Very poorly drained



View of wetland facing southwest.







WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Catoctin Mountain Park City/County: Frederick Sampling Date: 12/15/2020
 Applicant/Owner: NPS State: MD Sampling Point: WKD-003-U
 Investigator(s): KD, RW, BC, LP Section, Township, Range: not applicable
 Landform (hillslope, terrace, etc.): Hillside Local relief (concave, convex, none): Convex Slope (%): 15
 Subregion (LRR or MLRA): LRR N Lat: 39.64010 Long: -77.45004 Datum: WGS 84
 Soil Map Unit Name: Ravenrock-Rohresville complex, 3 to 15 percent slopes, extremely stony (RfC) NWI classification: upland
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No <u>X</u>	Is the Sampled Area within a Wetland? Yes _____ No <u>X</u>
Hydric Soil Present? Yes _____ No <u>X</u>	
Wetland Hydrology Present? Yes _____ No <u>X</u>	
Remarks:	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)		<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes _____ No <u>X</u> Depth (inches): _____ Saturation Present? Yes _____ No <u>X</u> Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No <u>X</u>	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks: No positive hydrology indicators observed		

VEGETATION (Five Strata) – Use scientific names of plants.

 Sampling Point: WKD-003-UPL

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
_____ = Total Cover				
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>				
Sapling Stratum (Plot size: <u>15'</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
_____ = Total Cover				
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>				
Shrub Stratum (Plot size: <u>15'</u>)				
1. <u>Berberis thunbergii</u>	20	Y	FACU	
2. <u>Rosa multiflora</u>	10	N	FACU	
3. <u>Rubus phoenicolasius</u>	30	Y	FACU	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
_____ = Total Cover				
50% of total cover: <u>30</u> 20% of total cover: <u>12</u>				
Herb Stratum (Plot size: <u>5'</u>)				
1. <u>Microstegium vimineum</u>	60	Y	FAC	
2. <u>Lonicera japonica</u>	30	Y	FAC	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
_____ = Total Cover				
50% of total cover: <u>45</u> 20% of total cover: <u>18</u>				
Woody Vine Stratum (Plot size: <u>30'</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
_____ = Total Cover				
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>				
Remarks: (Include photo numbers here or on a separate sheet.)				

Dominance Test worksheet:
 Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

 Total Number of Dominant Species Across All Strata: 4 (B)

 Percent of Dominant Species That Are OBL, FACW, or FAC: 50.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species <u>0</u>	x 1 = <u>0</u>
FACW species <u>0</u>	x 2 = <u>0</u>
FAC species <u>90</u>	x 3 = <u>270</u>
FACU species <u>60</u>	x 4 = <u>240</u>
UPL species <u>0</u>	x 5 = <u>0</u>
Column Totals: <u>150</u> (A)	<u>510</u> (B)

Prevalence Index = B/A = 3.40

Hydrophytic Vegetation Indicators:
☐ 1 - Rapid Test for Hydrophytic Vegetation
☐ 2 - Dominance Test is >50%
☐ 3 - Prevalence Index is ≤3.0¹
☐ 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
☐ Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes _____ No X

SOIL

Sampling Point: WKD-003-UPL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0 — 6	2.5Y 5/4	100					Silty loam	
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (LRR N)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)

- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) (MLRA 147, 148)
- ☐ Thin Dark Surface (S9) (MLRA 147, 148)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- ☐ Umbric Surface (F13) (MLRA 136, 122)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 148)
- ☐ Red Parent Material (F21) (MLRA 127, 147)

Indicators for Problematic Hydric Soils³:

- ☐ 2 cm Muck (A10) (MLRA 147)
- ☐ Coast Prairie Redox (A16) (MLRA 147, 148)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Yes

Type: Rock
Depth (inches): 6

Hydric Soil Present? Yes _____ No X

Remarks:

No positive hydric soil indicators observed



View of upland facing northeast

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Catoctin Mountain Park City/County: Frederick Sampling Date: 01/07/2021
 Applicant/Owner: National Park Service State: MD Sampling Point: WKD-004
 Investigator(s): KD and LP Section, Township, Range: not applicable
 Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Flat Slope (%): 3
 Subregion (LRR or MLRA): LRR N Lat: 39.64638 Long: -77.47305 Datum: WGS 84
 Soil Map Unit Name: RfC: Ravenrock-Rohrersville complex, 3 to 15 percent slopes, extremely stony NWI classification: PFO
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Hydric Soil Present? Yes <u>X</u> No _____	
Wetland Hydrology Present? Yes <u>X</u> No _____	
Remarks:	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input checked="" type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input checked="" type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)		<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input checked="" type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input checked="" type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes <u>X</u> No _____ Depth (inches): <u>1.00</u> Water Table Present? Yes <u>X</u> No _____ Depth (inches): <u>3</u> Saturation Present? Yes <u>X</u> No _____ Depth (inches): <u>0</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <u>X</u> No _____	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		

VEGETATION (Five Strata) – Use scientific names of plants.

 Sampling Point: WKD-004

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status															
1. <u>Acer rubrum</u>	30	Y	FAC	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A) Total Number of Dominant Species Across All Strata: <u>6</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>66.67</u> (A/B)														
2. _____																		
3. _____																		
4. _____																		
5. _____																		
6. _____																		
<u>30</u> = Total Cover				Prevalence Index worksheet: <table style="width: 100%;"> <tr> <td style="width: 50%;">Total % Cover of:</td> <td style="width: 50%;">Multiply by:</td> </tr> <tr> <td>OBL species <u>20</u></td> <td>x 1 = <u>20</u></td> </tr> <tr> <td>FACW species <u>0</u></td> <td>x 2 = <u>0</u></td> </tr> <tr> <td>FAC species <u>105</u></td> <td>x 3 = <u>315</u></td> </tr> <tr> <td>FACU species <u>20</u></td> <td>x 4 = <u>80</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>145</u> (A)</td> <td><u>415</u> (B)</td> </tr> </table> Prevalence Index = B/A = <u>2.86</u>	Total % Cover of:	Multiply by:	OBL species <u>20</u>	x 1 = <u>20</u>	FACW species <u>0</u>	x 2 = <u>0</u>	FAC species <u>105</u>	x 3 = <u>315</u>	FACU species <u>20</u>	x 4 = <u>80</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>145</u> (A)	<u>415</u> (B)
Total % Cover of:	Multiply by:																	
OBL species <u>20</u>	x 1 = <u>20</u>																	
FACW species <u>0</u>	x 2 = <u>0</u>																	
FAC species <u>105</u>	x 3 = <u>315</u>																	
FACU species <u>20</u>	x 4 = <u>80</u>																	
UPL species <u>0</u>	x 5 = <u>0</u>																	
Column Totals: <u>145</u> (A)	<u>415</u> (B)																	
50% of total cover: <u>15</u> 20% of total cover: <u>6</u>																		
Sapling Stratum (Plot size: <u>15'</u>)																		
1. _____																		
2. _____																		
3. _____																		
4. _____																		
5. _____																		
6. _____																		
<u>0</u> = Total Cover																		
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>																		
Shrub Stratum (Plot size: <u>15'</u>)																		
1. <u>Berberis thunbergii</u>	10	Y	FACU	Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.														
2. <u>Rosa multiflora</u>	10	Y	FACU															
3. _____																		
4. _____																		
5. _____																		
6. _____																		
<u>20</u> = Total Cover																		
50% of total cover: <u>10</u> 20% of total cover: <u>4</u>																		
Herb Stratum (Plot size: <u>5'</u>)																		
1. <u>Microstegium vimineum</u>	50	Y	FAC	Definitions of Five Vegetation Strata: Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH). Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height. Woody vine – All woody vines, regardless of height.														
2. <u>Carex aquatilis</u>	20	Y	OBL															
3. <u>Euthamia graminifolia</u>	25	Y	FAC															
4. _____																		
5. _____																		
6. _____																		
7. _____																		
8. _____																		
9. _____																		
10. _____																		
11. _____																		
<u>95</u> = Total Cover																		
50% of total cover: <u>48</u> 20% of total cover: <u>19</u>																		
Woody Vine Stratum (Plot size: <u>30'</u>)																		
1. _____																		
2. _____																		
3. _____																		
4. _____																		
5. _____																		
<u>0</u> = Total Cover																		
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>																		
Remarks: (Include photo numbers here or on a separate sheet.)																		

SOIL

Sampling Point: WKD-004

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0 — 10	10YR 3/1	90	7.5R 4/6	10	C	M	Silty loam	
10 — 16	2.5YR 4/3	100					Silty clay loam	
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ 2 cm Muck (A10) (**LRR N**)
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Sandy Mucky Mineral (S1) (**LRR N, MLRA 147, 148**)
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)

- ☐ Dark Surface (S7)
☐ Polyvalue Below Surface (S8) (**MLRA 147, 148**)
☐ Thin Dark Surface (S9) (**MLRA 147, 148**)
☐ Loamy Gleyed Matrix (F2)
☐ Depleted Matrix (F3)
☒ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Iron-Manganese Masses (F12) (**LRR N, MLRA 136**)
☐ Umbric Surface (F13) (**MLRA 136, 122**)
☐ Piedmont Floodplain Soils (F19) (**MLRA 148**)
☐ Red Parent Material (F21) (**MLRA 127, 147**)

Indicators for Problematic Hydric Soils³:

- ☐ 2 cm Muck (A10) (**MLRA 147**)
☐ Coast Prairie Redox (A16) (**MLRA 147, 148**)
☐ Piedmont Floodplain Soils (F19) (**MLRA 136, 147**)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): No

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:



View of wetland facing southeast



View of wetland facing southeast

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Catoctin Mountain Park City/County: Frederick Sampling Date: 01/07/2021
 Applicant/Owner: National Park Service State: MD Sampling Point: WKD-004-UPL
 Investigator(s): KD and LP Section, Township, Range: not applicable
 Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Flat Slope (%): 3
 Subregion (LRR or MLRA): LRR N Lat: 39.64640 Long: -77.47301 Datum: WGS 84
 Soil Map Unit Name: RfC: Ravenrock-Rohrersville complex, 3 to 15 percent slopes, extremely stony NWI classification: upland
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No <u>X</u>	Is the Sampled Area within a Wetland? Yes _____ No <u>X</u>
Hydric Soil Present? Yes _____ No <u>X</u>	
Wetland Hydrology Present? Yes _____ No <u>X</u>	
Remarks:	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)		<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes _____ No <u>X</u> Depth (inches): _____ Saturation Present? Yes _____ No <u>X</u> Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No <u>X</u>	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		
No positive hydrology indicators observed		

VEGETATION (Five Strata) – Use scientific names of plants.

 Sampling Point: WKD-004-UPL

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status															
1. <u>Carya ovata</u>	20	Y	FACU	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>7</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>28.57</u> (A/B)														
2. <u>Acer rubrum</u>	20	Y	FAC															
3. <u>Fraxinus americana</u>	30	Y	FACU															
4. _____																		
5. _____																		
6. _____																		
<u>70</u> = Total Cover				Prevalence Index worksheet: <table style="width: 100%;"> <tr> <th style="text-align: left;">Total % Cover of:</th> <th style="text-align: left;">Multiply by:</th> </tr> <tr> <td>OBL species <u>0</u></td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species <u>0</u></td> <td>x 2 = <u>0</u></td> </tr> <tr> <td>FAC species <u>60</u></td> <td>x 3 = <u>180</u></td> </tr> <tr> <td>FACU species <u>130</u></td> <td>x 4 = <u>520</u></td> </tr> <tr> <td>UPL species <u>10</u></td> <td>x 5 = <u>50</u></td> </tr> <tr> <td>Column Totals: <u>200</u> (A)</td> <td><u>750</u> (B)</td> </tr> </table> Prevalence Index = B/A = <u>3.75</u>	Total % Cover of:	Multiply by:	OBL species <u>0</u>	x 1 = <u>0</u>	FACW species <u>0</u>	x 2 = <u>0</u>	FAC species <u>60</u>	x 3 = <u>180</u>	FACU species <u>130</u>	x 4 = <u>520</u>	UPL species <u>10</u>	x 5 = <u>50</u>	Column Totals: <u>200</u> (A)	<u>750</u> (B)
Total % Cover of:	Multiply by:																	
OBL species <u>0</u>	x 1 = <u>0</u>																	
FACW species <u>0</u>	x 2 = <u>0</u>																	
FAC species <u>60</u>	x 3 = <u>180</u>																	
FACU species <u>130</u>	x 4 = <u>520</u>																	
UPL species <u>10</u>	x 5 = <u>50</u>																	
Column Totals: <u>200</u> (A)	<u>750</u> (B)																	
50% of total cover: <u>35</u> 20% of total cover: <u>14</u>																		
Sapling Stratum (Plot size: <u>15'</u>)																		
1. _____																		
2. _____																		
3. _____																		
4. _____																		
5. _____																		
6. _____																		
<u>0</u> = Total Cover																		
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>																		
Shrub Stratum (Plot size: <u>15'</u>)																		
1. <u>Berberis thunbergii</u>	60	Y	FACU	Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.														
2. _____																		
3. _____																		
4. _____																		
5. _____																		
6. _____																		
<u>60</u> = Total Cover																		
50% of total cover: <u>30</u> 20% of total cover: <u>12</u>																		
Herb Stratum (Plot size: <u>5'</u>)																		
1. <u>Carex sp.</u>	20	Y	UNK	Definitions of Five Vegetation Strata: Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH). Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height. Woody vine – All woody vines, regardless of height.														
2. <u>Elymus hystrix</u>	10	N	UPL															
3. <u>Microstegium vimineum</u>	40	Y	FAC															
4. <u>Allium canadense</u>	10	N	FACU															
5. <u>Solidago canadensis</u>	5	N	FACU															
6. _____																		
7. _____																		
8. _____																		
9. _____																		
10. _____																		
11. _____																		
<u>85</u> = Total Cover																		
50% of total cover: <u>43</u> 20% of total cover: <u>17</u>																		
Woody Vine Stratum (Plot size: <u>30'</u>)																		
1. <u>Vitis labrusca</u>	5	Y	FACU	Hydrophytic Vegetation Present? Yes _____ No <u>X</u>														
2. _____																		
3. _____																		
4. _____																		
5. _____																		
6. _____																		
<u>5</u> = Total Cover																		
50% of total cover: <u>3</u> 20% of total cover: <u>1</u>																		
Remarks: (Include photo numbers here or on a separate sheet.)																		

SOIL

Sampling Point: WKD-004-UPL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0 — 14	10YR 3/3	100					Loam	
14 — 20	2.5Y 4/4	100					Loam	
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ 2 cm Muck (A10) (**LRR N**)
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Sandy Mucky Mineral (S1) (**LRR N, MLRA 147, 148**)
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)

- ☐ Dark Surface (S7)
☐ Polyvalue Below Surface (S8) (**MLRA 147, 148**)
☐ Thin Dark Surface (S9) (**MLRA 147, 148**)
☐ Loamy Gleyed Matrix (F2)
☐ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Iron-Manganese Masses (F12) (**LRR N, MLRA 136**)
☐ Umbric Surface (F13) (**MLRA 136, 122**)
☐ Piedmont Floodplain Soils (F19) (**MLRA 148**)
☐ Red Parent Material (F21) (**MLRA 127, 147**)

Indicators for Problematic Hydric Soils³:

- ☐ 2 cm Muck (A10) (**MLRA 147**)
☐ Coast Prairie Redox (A16) (**MLRA 147, 148**)
☐ Piedmont Floodplain Soils (F19) (**MLRA 136, 147**)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): No

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

No positive hydric soil indicators observed



Upland area view facing northwest

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Catoctin Mountain Park City/County: Frederick Sampling Date: 01/07/2021
 Applicant/Owner: National Park Service State: MD Sampling Point: WKD-005-WET
 Investigator(s): KD and LP Section, Township, Range: not applicable
 Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Convex Slope (%): 10
 Subregion (LRR or MLRA): LRR N Lat: 39.64419 Long: -77.47428 Datum: WGS 84
 Soil Map Unit Name: HhB: Highfield gravelly silt loam, 3 to 8 percent slopes, very stony NWI classification: PEM
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Hydric Soil Present? Yes <u>X</u> No _____	
Wetland Hydrology Present? Yes <u>X</u> No _____	
Remarks:	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input checked="" type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)		<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes <u>X</u> No _____ Depth (inches): <u>1.50</u> Water Table Present? Yes <u>X</u> No _____ Depth (inches): <u>3</u> Saturation Present? Yes <u>X</u> No _____ Depth (inches): <u>0.00</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <u>X</u> No _____	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		

VEGETATION (Five Strata) – Use scientific names of plants.

 Sampling Point: WKD-005-WET

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
_____ = Total Cover				
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>				
Sapling Stratum (Plot size: <u>15'</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
_____ = Total Cover				
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>				
Shrub Stratum (Plot size: <u>15'</u>)				
1. <u>Rosa multiflora</u>	<u>5</u>	<u>Y</u>	<u>FACU</u>	
2. <u>Lindera benzoin</u>	<u>5</u>	<u>Y</u>	<u>FAC</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
_____ = Total Cover				
50% of total cover: <u>5</u> 20% of total cover: <u>2</u>				
Herb Stratum (Plot size: <u>5'</u>)				
1. <u>Microstegium vimineum</u>	<u>50</u>	<u>Y</u>	<u>FAC</u>	
2. <u>Carex sp.</u>	<u>40</u>	<u>Y</u>	<u>UNK</u>	
3. <u>Mimulus ringens</u>	<u>20</u>	<u>N</u>	<u>OBL</u>	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
_____ = Total Cover				
50% of total cover: <u>55</u> 20% of total cover: <u>22</u>				
Woody Vine Stratum (Plot size: <u>30'</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
_____ = Total Cover				
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>				

Remarks: (Include photo numbers here or on a separate sheet.)

Dominance Test worksheet:
 Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

 Total Number of Dominant Species Across All Strata: 5 (B)

 Percent of Dominant Species That Are OBL, FACW, or FAC: 60.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species <u>20</u>	x 1 = <u>20</u>
FACW species <u>0</u>	x 2 = <u>0</u>
FAC species <u>55</u>	x 3 = <u>165</u>
FACU species <u>5</u>	x 4 = <u>20</u>
UPL species <u>0</u>	x 5 = <u>0</u>
Column Totals: <u>80</u> (A)	<u>205</u> (B)

Prevalence Index = B/A = 2.56

Hydrophytic Vegetation Indicators:
 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
 3 - Prevalence Index is ≤3.0¹
 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes X No

SOIL

Sampling Point: WKD-005-WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0 — 6	10YR 2/2	90	7.5YR 4/6	10	C	PL	Silty clay loam	
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ 2 cm Muck (A10) (**LRR N**)
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Sandy Mucky Mineral (S1) (**LRR N, MLRA 147, 148**)
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)

- ☐ Dark Surface (S7)
☐ Polyvalue Below Surface (S8) (**MLRA 147, 148**)
☐ Thin Dark Surface (S9) (**MLRA 147, 148**)
☐ Loamy Gleyed Matrix (F2)
☐ Depleted Matrix (F3)
☒ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Iron-Manganese Masses (F12) (**LRR N, MLRA 136**)
☐ Umbric Surface (F13) (**MLRA 136, 122**)
☐ Piedmont Floodplain Soils (F19) (**MLRA 148**)
☐ Red Parent Material (F21) (**MLRA 127, 147**)

Indicators for Problematic Hydric Soils³:

- ☐ 2 cm Muck (A10) (**MLRA 147**)
☐ Coast Prairie Redox (A16) (**MLRA 147, 148**)
☐ Piedmont Floodplain Soils (F19) (**MLRA 136, 147**)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Yes

Type: RockDepth (inches): 6Hydric Soil Present? Yes X No

Remarks:



View of wetland facing southeast.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Catoctin Mountain Park City/County: Frederick Sampling Date: 01/07/2021
Applicant/Owner: National Park Service State: MD Sampling Point: WKD-005-UPL
Investigator(s): KD and LP Section, Township, Range: not applicable
Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): 5
Subregion (LRR or MLRA): LRR N Lat: 39.64415 Long: -77.47428 Datum: WGS 84
Soil Map Unit Name: HhB: Highfield gravelly silt loam, 3 to 8 percent slopes, very stony NWI classification: upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No <u>X</u>	Is the Sampled Area within a Wetland? Yes _____ No <u>X</u>
Hydric Soil Present? Yes _____ No <u>X</u>	
Wetland Hydrology Present? Yes _____ No <u>X</u>	
Remarks:	

HYDROLOGY

Wetland Hydrology Indicators:		Secondary Indicators (minimum of two required)
<u>Primary Indicators (minimum of one is required; check all that apply)</u>		
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> True Aquatic Plants (B14)	<input type="checkbox"/> Surface Soil Cracks (B6)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Moss Trim Lines (B16)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Iron Deposits (B5)		<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)		<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Water-Stained Leaves (B9)		<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Aquatic Fauna (B13)		<input type="checkbox"/> Microtopographic Relief (D4)
		<input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations:		
Surface Water Present? Yes _____ No <u>X</u>	Depth (inches): _____	
Water Table Present? Yes _____ No <u>X</u>	Depth (inches): _____	
Saturation Present? Yes _____ No <u>X</u>	Depth (inches): _____	
(includes capillary fringe)		Wetland Hydrology Present? Yes _____ No <u>X</u>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		
No positive hydrology indicators observed		

VEGETATION (Five Strata) – Use scientific names of plants.

Sampling Point: WKD-005-UPL

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status															
1. <u>Liriodendron tulipifera</u>	20	Y	FACU	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>7</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>14.28</u> (A/B)														
2. <u>Acer saccharum</u>	10	Y	FACU															
3. <u>Acer rubrum</u>	5	N	FAC															
4. <u>Quercus rubra</u>	10	Y	FACU															
5. _____				Prevalence Index worksheet: <table style="width: 100%;"> <tr> <th style="text-align: left;">Total % Cover of:</th> <th style="text-align: left;">Multiply by:</th> </tr> <tr> <td>OBL species <u>0</u></td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species <u>0</u></td> <td>x 2 = <u>0</u></td> </tr> <tr> <td>FAC species <u>45</u></td> <td>x 3 = <u>135</u></td> </tr> <tr> <td>FACU species <u>65</u></td> <td>x 4 = <u>260</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>110</u> (A)</td> <td><u>395</u> (B)</td> </tr> </table> Prevalence Index = B/A = <u>3.59</u>	Total % Cover of:	Multiply by:	OBL species <u>0</u>	x 1 = <u>0</u>	FACW species <u>0</u>	x 2 = <u>0</u>	FAC species <u>45</u>	x 3 = <u>135</u>	FACU species <u>65</u>	x 4 = <u>260</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>110</u> (A)	<u>395</u> (B)
Total % Cover of:	Multiply by:																	
OBL species <u>0</u>	x 1 = <u>0</u>																	
FACW species <u>0</u>	x 2 = <u>0</u>																	
FAC species <u>45</u>	x 3 = <u>135</u>																	
FACU species <u>65</u>	x 4 = <u>260</u>																	
UPL species <u>0</u>	x 5 = <u>0</u>																	
Column Totals: <u>110</u> (A)	<u>395</u> (B)																	
6. _____																		
<u>45</u> = Total Cover 50% of total cover: <u>23</u> 20% of total cover: <u>9</u>																		
Sapling Stratum (Plot size: 15')																		
1. _____				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)														
2. _____																		
3. _____																		
4. _____																		
5. _____				¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.														
6. _____																		
<u>10</u> = Total Cover 50% of total cover: <u>5</u> 20% of total cover: <u>2</u>																		
Shrub Stratum (Plot size: 15')																		
1. <u>Hamamelis virginiana</u>	5	Y	FACU	Definitions of Five Vegetation Strata: Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH). Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height. Woody vine – All woody vines, regardless of height.														
2. _____																		
3. _____																		
4. _____																		
5. _____				Hydrophytic Vegetation Present? Yes _____ No <u>X</u>														
6. _____																		
<u>5</u> = Total Cover 50% of total cover: <u>3</u> 20% of total cover: <u>1</u>																		
Herb Stratum (Plot size: 5')																		
1. <u>Microstegium vimineum</u>	40	Y	FAC	(Empty space for additional notes or calculations)														
2. <u>Symphyotrichum ericoides</u>	10	Y	FACU															
3. _____																		
4. _____																		
5. _____																		
6. _____																		
7. _____																		
8. _____																		
9. _____																		
10. _____																		
11. _____																		
<u>50</u> = Total Cover 50% of total cover: <u>25</u> 20% of total cover: <u>10</u>																		
Woody Vine Stratum (Plot size: 30')																		
1. _____				(Empty space for additional notes or calculations)														
2. _____																		
3. _____																		
4. _____																		
5. _____				(Empty space for additional notes or calculations)														
<u>0</u> = Total Cover 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>																		
Remarks: (Include photo numbers here or on a separate sheet.)																		

SOIL

Sampling Point: WKD-005-UPL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0 — 18	10YR 3/2	100					Silty clay loam	
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ 2 cm Muck (A10) (**LRR N**)
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Sandy Mucky Mineral (S1) (**LRR N, MLRA 147, 148**)
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)

- ☐ Dark Surface (S7)
☐ Polyvalue Below Surface (S8) (**MLRA 147, 148**)
☐ Thin Dark Surface (S9) (**MLRA 147, 148**)
☐ Loamy Gleyed Matrix (F2)
☐ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Iron-Manganese Masses (F12) (**LRR N, MLRA 136**)
☐ Umbric Surface (F13) (**MLRA 136, 122**)
☐ Piedmont Floodplain Soils (F19) (**MLRA 148**)
☐ Red Parent Material (F21) (**MLRA 127, 147**)

Indicators for Problematic Hydric Soils³:

- ☐ 2 cm Muck (A10) (**MLRA 147**)
☐ Coast Prairie Redox (A16) (**MLRA 147, 148**)
☐ Piedmont Floodplain Soils (F19) (**MLRA 136, 147**)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): No

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

No positive hydric soil indicators observed



View of upland facing northwest

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Catoctin Mountain Park City/County: Frederick Sampling Date: 01/08/2021
Applicant/Owner: National Park Service State: MD Sampling Point: W-KD-006-WET
Investigator(s): KD and LP Section, Township, Range: not applicable
Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Undulating Slope (%): 3
Subregion (LRR or MLRA): LRR N Lat: 39.64578 Long: -77.45964 Datum: WGS 84
Soil Map Unit Name: ReB: Ravenrock-Highfield-Rock outcrop complex, 0 to 8 percent slopes NWI classification: PFO
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation , Soil , or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u> </u> No <u>X</u>	Is the Sampled Area within a Wetland? Yes <u>X</u> No <u> </u>
Hydric Soil Present? Yes <u>X</u> No <u> </u>	
Wetland Hydrology Present? Yes <u>X</u> No <u> </u>	
Remarks: Stream channel shows evidence of channelization with a berm along the southern bank. Also, the vegetation dominated by an invasive species (<i>Berberis thunbergii</i>), which often becomes dominant in disturbed wetlands.	

HYDROLOGY

Wetland Hydrology Indicators:		Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)		
<input checked="" type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> True Aquatic Plants (B14)	<input type="checkbox"/> Surface Soil Cracks (B6)
<input checked="" type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)	<input type="checkbox"/> Drainage Patterns (B10)
<input checked="" type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Moss Trim Lines (B16)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Iron Deposits (B5)		<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)		<input type="checkbox"/> Geomorphic Position (D2)
<input checked="" type="checkbox"/> Water-Stained Leaves (B9)		<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Aquatic Fauna (B13)		<input type="checkbox"/> Microtopographic Relief (D4)
		<input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations:		Wetland Hydrology Present? Yes <u> </u> No <u>X</u>
Surface Water Present? Yes <u>X</u> No <u> </u> Depth (inches): <u>0.50</u>		
Water Table Present? Yes <u>X</u> No <u> </u> Depth (inches): <u>0.00</u>		
Saturation Present? Yes <u>X</u> No <u> </u> Depth (inches): <u>0.00</u> (includes capillary fringe)		
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		

VEGETATION (Five Strata) – Use scientific names of plants.

 Sampling Point: W-KD-006-WET

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status															
1. <u>Nyssa sylvatica</u>	15	Y	FAC	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>6</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>50</u> (A/B)														
2. <u>Fraxinus pennsylvanica</u>	10	Y	FACW															
3. <u>Quercus alba</u>	10	Y	FACU															
4. <u>Carya ovata</u>	10	Y	FACU															
5. _____																		
6. _____																		
<u>45</u> = Total Cover				Prevalence Index worksheet: <table style="width: 100%;"> <tr> <th style="text-align: left;">Total % Cover of:</th> <th style="text-align: left;">Multiply by:</th> </tr> <tr> <td>OBL species <u>0</u></td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species <u>10</u></td> <td>x 2 = <u>20</u></td> </tr> <tr> <td>FAC species <u>110</u></td> <td>x 3 = <u>330</u></td> </tr> <tr> <td>FACU species <u>50</u></td> <td>x 4 = <u>200</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>170</u> (A)</td> <td><u>550</u> (B)</td> </tr> </table> Prevalence Index = B/A = <u>3.23</u>	Total % Cover of:	Multiply by:	OBL species <u>0</u>	x 1 = <u>0</u>	FACW species <u>10</u>	x 2 = <u>20</u>	FAC species <u>110</u>	x 3 = <u>330</u>	FACU species <u>50</u>	x 4 = <u>200</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>170</u> (A)	<u>550</u> (B)
Total % Cover of:	Multiply by:																	
OBL species <u>0</u>	x 1 = <u>0</u>																	
FACW species <u>10</u>	x 2 = <u>20</u>																	
FAC species <u>110</u>	x 3 = <u>330</u>																	
FACU species <u>50</u>	x 4 = <u>200</u>																	
UPL species <u>0</u>	x 5 = <u>0</u>																	
Column Totals: <u>170</u> (A)	<u>550</u> (B)																	
50% of total cover: <u>23</u> 20% of total cover: <u>9</u>																		
Sapling Stratum (Plot size: <u>15'</u>)																		
1. _____																		
2. _____																		
3. _____																		
4. _____																		
5. _____																		
6. _____																		
<u>0</u> = Total Cover																		
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>																		
Shrub Stratum (Plot size: <u>15'</u>)																		
1. <u>Berberis thunbergii</u>	30	Y	FACU	Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.														
2. _____																		
3. _____																		
4. _____																		
5. _____																		
6. _____																		
<u>30</u> = Total Cover																		
50% of total cover: <u>15</u> 20% of total cover: <u>6</u>																		
Herb Stratum (Plot size: <u>5'</u>)																		
1. <u>Microstegium vimineum</u>	95	Y	FAC	Definitions of Five Vegetation Strata: Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH). Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height. Woody vine – All woody vines, regardless of height.														
2. _____																		
3. _____																		
4. _____																		
5. _____																		
6. _____																		
7. _____																		
8. _____																		
9. _____																		
10. _____																		
11. _____																		
<u>95</u> = Total Cover																		
50% of total cover: <u>48</u> 20% of total cover: <u>19</u>																		
Woody Vine Stratum (Plot size: <u>30'</u>)																		
1. _____				Hydrophytic Vegetation Present? Yes _____ No <u>X</u>														
2. _____																		
3. _____																		
4. _____																		
5. _____																		
6. _____																		
<u>0</u> = Total Cover																		
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>																		
Remarks: (Include photo numbers here or on a separate sheet.)																		

SOIL

Sampling Point: W-KD-006-WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0 — 6	10YR 2/2	90	10YR 4/6	10	C	M	Silty loam	
6 — 10	10YR 4/6	100					see remark	soil texture silty clay loam
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ 2 cm Muck (A10) (**LRR N**)
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Sandy Mucky Mineral (S1) (**LRR N, MLRA 147, 148**)
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)

- ☐ Dark Surface (S7)
☐ Polyvalue Below Surface (S8) (**MLRA 147, 148**)
☐ Thin Dark Surface (S9) (**MLRA 147, 148**)
☐ Loamy Gleyed Matrix (F2)
☐ Depleted Matrix (F3)
☒ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Iron-Manganese Masses (F12) (**LRR N, MLRA 136**)
☐ Umbric Surface (F13) (**MLRA 136, 122**)
☐ Piedmont Floodplain Soils (F19) (**MLRA 148**)
☐ Red Parent Material (F21) (**MLRA 127, 147**)

Indicators for Problematic Hydric Soils³:

- ☐ 2 cm Muck (A10) (**MLRA 147**)
☐ Coast Prairie Redox (A16) (**MLRA 147, 148**)
☐ Piedmont Floodplain Soils (F19) (**MLRA 136, 147**)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Yes

Type: RockDepth (inches): 10Hydric Soil Present? Yes X No

Remarks:



View of wetland facing northeast

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Catoctin Mountain Park City/County: Frederick Sampling Date: 01/08/2021
Applicant/Owner: National Park Service State: MD Sampling Point: W-KD-006-U
Investigator(s): KD and LP Section, Township, Range: not applicable
Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Flat Slope (%): 1
Subregion (LRR or MLRA): LRR N Lat: 39.64558 Long: -77.45963 Datum: WGS 84
Soil Map Unit Name: ReB: Ravenrock-Highfield-Rock outcrop complex, 0 to 8 percent slopes NWI classification: upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u> </u> No <u>X</u>	Is the Sampled Area within a Wetland? Yes <u> </u> No <u>X</u>
Hydric Soil Present? Yes <u> </u> No <u>X</u>	
Wetland Hydrology Present? Yes <u> </u> No <u>X</u>	
Remarks:	

HYDROLOGY

Wetland Hydrology Indicators:		Secondary Indicators (minimum of two required)
<u>Primary Indicators (minimum of one is required; check all that apply)</u>		
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> True Aquatic Plants (B14)	<input type="checkbox"/> Surface Soil Cracks (B6)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Moss Trim Lines (B16)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Iron Deposits (B5)		<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)		<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Water-Stained Leaves (B9)		<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Aquatic Fauna (B13)		<input type="checkbox"/> Microtopographic Relief (D4)
		<input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations:		
Surface Water Present? Yes <u> </u> No <u>X</u>	Depth (inches): <u> </u>	Wetland Hydrology Present? Yes <u> </u> No <u>X</u>
Water Table Present? Yes <u> </u> No <u>X</u>	Depth (inches): <u> </u>	
Saturation Present? Yes <u> </u> No <u>X</u>	Depth (inches): <u> </u> (includes capillary fringe)	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		
No positive hydrology indicators observed		

VEGETATION (Five Strata) – Use scientific names of plants.

 Sampling Point: W-KD-006-UPL

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status															
1. <u>Quercus alba</u>	10	N	FACU	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>5</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>20.00</u> (A/B)														
2. <u>Sassafras albidum</u>	10	N	FACU															
3. <u>Quercus rubra</u>	60	Y	FACU															
4. <u>Cornus florida</u>	10	N	FACU															
5. _____																		
6. _____																		
<u>90</u> = Total Cover				Prevalence Index worksheet: <table style="width: 100%;"> <tr> <th style="text-align: left;">Total % Cover of:</th> <th style="text-align: left;">Multiply by:</th> </tr> <tr> <td>OBL species <u>0</u></td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species <u>0</u></td> <td>x 2 = <u>0</u></td> </tr> <tr> <td>FAC species <u>75</u></td> <td>x 3 = <u>225</u></td> </tr> <tr> <td>FACU species <u>198</u></td> <td>x 4 = <u>792</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>283</u> (A)</td> <td><u>1017</u> (B)</td> </tr> </table> Prevalence Index = B/A = <u>3.59</u>	Total % Cover of:	Multiply by:	OBL species <u>0</u>	x 1 = <u>0</u>	FACW species <u>0</u>	x 2 = <u>0</u>	FAC species <u>75</u>	x 3 = <u>225</u>	FACU species <u>198</u>	x 4 = <u>792</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>283</u> (A)	<u>1017</u> (B)
Total % Cover of:	Multiply by:																	
OBL species <u>0</u>	x 1 = <u>0</u>																	
FACW species <u>0</u>	x 2 = <u>0</u>																	
FAC species <u>75</u>	x 3 = <u>225</u>																	
FACU species <u>198</u>	x 4 = <u>792</u>																	
UPL species <u>0</u>	x 5 = <u>0</u>																	
Column Totals: <u>283</u> (A)	<u>1017</u> (B)																	
50% of total cover: <u>45</u> 20% of total cover: <u>18</u>																		
Sapling Stratum (Plot size: <u>15'</u>)																		
1. _____																		
2. _____																		
3. _____																		
4. _____																		
5. _____																		
6. _____																		
<u>15</u> = Total Cover																		
50% of total cover: <u>8</u> 20% of total cover: <u>3</u>																		
Shrub Stratum (Plot size: <u>15'</u>)																		
1. <u>Lonicera morrowii</u>	3	N	FACU	Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.														
2. <u>Berberis thunbergii</u>	75	Y	FACU															
3. <u>Rubus phoenicolasius</u>	10	N	FACU															
4. _____																		
5. _____																		
6. _____																		
<u>88</u> = Total Cover																		
50% of total cover: <u>44</u> 20% of total cover: <u>18</u>																		
Herb Stratum (Plot size: <u>5'</u>)																		
1. <u>Microstegium vimineum</u>	75	Y	FAC	Definitions of Five Vegetation Strata: Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH). Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height. Woody vine – All woody vines, regardless of height.														
2. <u>Carex sp.</u>	10	N	UNK															
3. <u>Symphytotrichum ericoides</u>	5	N	FACU															
4. _____																		
5. _____																		
6. _____																		
7. _____																		
8. _____																		
9. _____																		
10. _____																		
11. _____																		
<u>90</u> = Total Cover																		
50% of total cover: <u>45</u> 20% of total cover: <u>18</u>																		
Woody Vine Stratum (Plot size: <u>30'</u>)																		
1. _____				Hydrophytic Vegetation Present? Yes _____ No <u>X</u>														
2. _____																		
3. _____																		
4. _____																		
5. _____																		
6. _____																		
<u>0</u> = Total Cover																		
50% of total cover: <u>0</u> 20% of total cover: <u>0</u>																		
Remarks: (Include photo numbers here or on a separate sheet.)																		

SOIL

Sampling Point: W-KD-006-UPL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0 — 8	10YR 3/3	100					Loam	
8 — 16	10YR 5/6	100					Loam	
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								
—								

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ 2 cm Muck (A10) (**LRR N**)
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Sandy Mucky Mineral (S1) (**LRR N, MLRA 147, 148**)
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)

- ☐ Dark Surface (S7)
☐ Polyvalue Below Surface (S8) (**MLRA 147, 148**)
☐ Thin Dark Surface (S9) (**MLRA 147, 148**)
☐ Loamy Gleyed Matrix (F2)
☐ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Iron-Manganese Masses (F12) (**LRR N, MLRA 136**)
☐ Umbric Surface (F13) (**MLRA 136, 122**)
☐ Piedmont Floodplain Soils (F19) (**MLRA 148**)
☐ Red Parent Material (F21) (**MLRA 127, 147**)

Indicators for Problematic Hydric Soils³:

- ☐ 2 cm Muck (A10) (**MLRA 147**)
☐ Coast Prairie Redox (A16) (**MLRA 147, 148**)
☐ Piedmont Floodplain Soils (F19) (**MLRA 136, 147**)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): No

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

No positive hydric soil indicators observed



View of upland facing west



Appendix C – Wetland Function-Value Evaluation Forms

Wetland Function-Value Evaluation Form

Total area of wetland <1ac Human made? N Is wetland part of a wildlife corridor? N or a "habitat island"? N

Adjacent land use Road Distance to nearest roadway or other development 0'

Dominant wetland systems present Yes Contiguous undeveloped buffer zone present No

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? Floodplain

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. W-KD-001













Latitude 39.6433 Longitude -77.4463

Prepared by: BC Date 12/14/2020

Wetland Impact:
Type Utility Area TBD

Evaluation based on:
Office _____ Field X

Corps manual wetland delineation
completed? Y X N _____

Function/Value	Suitability Y / N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
 Groundwater Recharge/Discharge	Y	7,8,9		Shallow groundwater adjacent to perennial stream.
 Floodflow Alteration	Y	5,6		Hydric soils can store water.
 Fish and Shellfish Habitat	Y	1,2		Forested; Shade covers adjacent stream; not suitable for fish or shellfish.
 Sediment/Toxicant Retention	Y	10		Adjacent to stream.
 Nutrient Removal	Y	3		Overall potential to trap sediments.
 Production Export	Y	1, 2, 4, 10,12,		
 Sediment/Shoreline Stabilization	N			
 Wildlife Habitat	Y	11		Forested. Potential for nesting birds.
 Recreation	Y	1,4,11, 12		Located within National Park
 Educational/Scientific Value	Y	1		Potential for rare or sensitive species
 Uniqueness/Heritage	Y	5,6,7,8,9,10, 11, 22		
 Visual Quality/Aesthetics	Y	7,9		Clean and accessible. Free of trash and debris.
ES Endangered Species Habitat	Y	1, 2		NPS identified a rare plant in the vicinity of this wetland
Other				

Notes:

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland <1ac Human made? N Is wetland part of a wildlife corridor? N or a "habitat island"? N

Adjacent land use Road Distance to nearest roadway or other development 50'

Dominant wetland systems present Yes Contiguous undeveloped buffer zone present No

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? Floodplain

How many tributaries contribute to the wetland? 1 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. W-KD-002













Latitude 39.65863 Longitude -77.4837

Prepared by: BC Date 12/15/2020

Wetland Impact:
Type Utility Area TBD

Evaluation based on:
Office _____ Field X

Corps manual wetland delineation
completed? Y X N _____

Function/Value	Suitability Y / N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
 Groundwater Recharge/Discharge	Y	6,7,9		Rocky soils
 Floodflow Alteration	Y	5,6,8,9,10,13		Hydric soils can store water. adjacent to perennial stream in floodplain.
 Fish and Shellfish Habitat	Y	1,2,4,7,8,14,17		Forested; Shade covers stream; adjoining stream is habitat for trout
 Sediment/Toxicant Retention	Y	9,10		No ditching. Adjacent to stream.
 Nutrient Removal	Y	3		Overall potential to trap sediments.
 Production Export	Y	1, 2, 4, 5, 10,12		Evidence of wildlife (deer)
 Sediment/Shoreline Stabilization	Y	1,4,6,7		
 Wildlife Habitat	Y	5,6,7,11,17		Forested. Potential for nesting birds. Deer.
 Recreation	Y	1,2,4,7,8,10,11,12		Located within National Park
 Educational/Scientific Value	Y	1,3,6,8,9,10,11		Potential for rare or sensitive species previously surveyed
 Uniqueness/Heritage	Y	7,8,9,10, 11,17,22,24		Wetland is within 50 yards of the nearest perennial watercourse
 Visual Quality/Aesthetics	Y	7,9		Clean and accessible. Free of trash and debris.
ES Endangered Species Habitat	Y	1,2		Potential - previously identified RTE plant species
Other				

Notes:

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland <1ac Human made? N Is wetland part of a wildlife corridor? N or a "habitat island"? N

Adjacent land use Campground Distance to nearest roadway or other development 500'+

Dominant wetland systems present Yes Contiguous undeveloped buffer zone present Yes

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? Floodplain/headwaters

How many tributaries contribute to the wetland? 1 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. W-KD-003













Latitude 39.64010 Longitude -77.45004

Prepared by: BC Date 12/15/2020

Wetland Impact:
Type Utility Area TBD

Evaluation based on:
Office _____ Field X

Corps manual wetland delineation
completed? Y X N _____

Function/Value	Suitability Y / N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
 Groundwater Recharge/Discharge	Y	6,7,9		Rocky soils
 Floodflow Alteration	Y	5,9,10,13		Hydric soils can store water and adjacent to stream
 Fish and Shellfish Habitat	Y	1		Forested but not fish habitat.
 Sediment/Toxicant Retention	Y	9,10		No ditching. Adjacent to stream.
 Nutrient Removal	Y	3		Overall potential to trap sediments.
 Production Export	Y	1,2,4,5,7,12		
 Sediment/Shoreline Stabilization	Y	2,3,4,7		Topo gradient on slope
 Wildlife Habitat	Y	1,3,4,5,6		Surrounded by forested upland
 Recreation	Y	1,6,10,12		Located within National Park
 Educational/Scientific Value	Y	2,9,10		Little or no disturbance is occurring in this wetland.
 Uniqueness/Heritage	Y	7,8,9,10,17		Overall view of the wetland is available from the surrounding upland
 Visual Quality/Aesthetics	Y	7,9		Clean and accessible. Free of trash and debris.
ES Endangered Species Habitat	N			Unknown
Other				

Notes:

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland <1ac Human made? N Is wetland part of a wildlife corridor? N or a "habitat island"? N

Adjacent land use Access roads through state park Distance to nearest roadway or other development 60'

Dominant wetland systems present Yes Contiguous undeveloped buffer zone present No

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? Floodplain

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. W-KD-004













Latitude 39.64638 Longitude -77.47304

Prepared by: LP Date 01/14/2021

Wetland Impact:
Type Utility Area TBD

Evaluation based on:
Office _____ Field X

Corps manual wetland delineation
completed? Y X N _____

Function/Value	Suitability Y / N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
 Groundwater Recharge/Discharge	Y	6,7		Bedrock occurs in wetland
 Floodflow Alteration	Y	2,3,5,6,9,10,13		Saturated soils present
 Fish and Shellfish Habitat	N	1,14,15,17		Habitat not suitable for fish or shellfish.
 Sediment/Toxicant Retention	Y	5,9,10,13		No ditching.
 Nutrient Removal	Y	3,14		Potential for sediment trapping exists.
 Production Export	Y	1,2,4,5,7,10,12		Evidence of wildlife (deer, squirrels, birds)
 Sediment/Shoreline Stabilization	Y	6		distinct bank is present between watercourse and wetland
 Wildlife Habitat	Y	1,3,7,17,19,20		Scat present.
 Recreation	Y	1		Located within National Park
 Educational/Scientific Value	Y	2,6,11,13,14		Adjacent to main road; no off road parking available; closes during winter storm
 Uniqueness/Heritage	Y	10, 11,16, 17, 22		watercourse adjacent to wetland
 Visual Quality/Aesthetics	Y	7,11		Free of trash and debris.
ES Endangered Species Habitat	N			Unknown
Other				

Notes:

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland <1ac Human made? N Is wetland part of a wildlife corridor? N or a "habitat island"? N

Adjacent land use Trails, cabins, horse barn, recreational facilities Distance to nearest roadway or other development 70'

Dominant wetland systems present Yes Contiguous undeveloped buffer zone present No

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? Floodplain

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. W-KD-005













Latitude 39.64419 Longitude 77.47428

Prepared by: LP Date 01/14/2021

Wetland Impact:
Type Utility Area TBD

Evaluation based on:
Office _____ Field X

Corps manual wetland delineation
completed? Y X N _____

Function/Value	Suitability Y / N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
 Groundwater Recharge/Discharge	Y	2,6		Potential for wells due to close proximity of cabins
 Floodflow Alteration	Y	2,5,6,7,8,9,11		Ponded water present. Historic cabins present.
 Fish and Shellfish Habitat	N	1		Forested. No watercourse present. Habitat not suitable for fish or shellfish.
 Sediment/Toxicant Retention	Y	5,9		No ditching.
 Nutrient Removal	Y	5		Wetland saturated
 Production Export	Y	1,2,4,5		Evidence of wildlife (deer, squirrels, birds)
 Sediment/Shoreline Stabilization	Y	3		No watercourse present.
 Wildlife Habitat	Y	1,3,7,17,19,20		Scat present.
 Recreation	Y	1,4,10,11,12		Located within National Park
 Educational/Scientific Value	Y	2,4,6,8,10,13,14		Area is closed during winter months
 Uniqueness/Heritage	Y	9,10,16,17,19,20		Historic cabins located adjacent to wetland
 Visual Quality/Aesthetics	Y	7,9,11		Free of trash and debris.
ES Endangered Species Habitat	N			Unknown
Other				

Notes:

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland <1ac Human made? N Is wetland part of a wildlife corridor? N or a "habitat island"? N

Adjacent land use Road Distance to nearest roadway or other development 100'

Dominant wetland systems present Yes Contiguous undeveloped buffer zone present No

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? Floodplain

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. W-KD-006













Latitude 39.64578 Longitude -77.45964

Prepared by: LP Date 01/13/2021

Wetland Impact:
Type Utility Area TBD

Evaluation based on:
Office _____ Field X

Corps manual wetland delineation
completed? Y X N _____

Function/Value	Suitability Y / N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
 Groundwater Recharge/Discharge	Y	6,7,9		Shallow rock layer present.
 Floodflow Alteration	Y	5,6,8,9,10,13		Hydric soils can store water. adjacent to perennial stream in floodplain.
 Fish and Shellfish Habitat	Y	1,4,8,14,17		Wetland is not suitable for fish or shellfish.
 Sediment/Toxicant Retention	Y	9,10		No ditching. Adjacent to stream.
 Nutrient Removal	Y	3,5		Overall potential to trap sediments.
 Production Export	Y	1,2,4,5,7,10		Evidence of wildlife (deer, squirrels, birds)
 Sediment/Shoreline Stabilization	Y	4,6,7		Distinct bank between waterbody and wetland.
 Wildlife Habitat	Y	1,3,7,11,17,19,20		Potential for nesting birds. Deer tracks and scat present.
 Recreation	Y	1		Located within National Park
 Educational/Scientific Value	Y	2,4,6,10,11,13,14		Close proximity to Camp David boundary
 Uniqueness/Heritage	Y	10,11,16,17,22		Wetland is within 50 yards of the nearest perennial watercourse
 Visual Quality/Aesthetics	Y	7,11		Free of trash and debris.
ES Endangered Species Habitat	N			Unknown
Other				

Notes:

* Refer to backup list of numbered considerations.



Appendix D – Stream and Waterbody Functional Assessment Forms

WATERBODY DATA FORM

WATERBODY ID No.: S-KD-001		WATERBODY NAME: Unnamed Tributary to Big Hunting Creek	
SURVEY TYPE: Utility			
DATE: 12/14/2020		CLIENT/PROJECT NAME: NPS/PROJECT CATO	
INVESTIGATORS: BC, KD, RW, LP		ROVER FILE: KD_121420.SSF	
STATE/COUNTY: Frederick County, MD		QUAD NAME: Blue Ridge Summit, PA, MD	
WATERBODY CHARACTERISTICS			
WATERBODY TYPE:	Stream		
FLOW EVENTS/YEAR:	NA		
FLOW TYPE:	Ephemeral		
AVG. STREAM DEPTH:	<1 (in)		
AVG. STREAM WIDTH (WATER SURFACE):	1 (ft)	TOP OF BANK (AT CROSSING LOCATION): 3 (ft)	ORDINARY HIGH WATER MARK WIDTH (AT CROSSING LOCATION): 1 (ft)
ORDINARY HIGH WATER MARK INDICATORS:	Sediment sorting		
AVG. BANK HEIGHT:	1 (ft)		
AVG. BANK SLOPE (RATIO):	2:1		
QUALITATIVE ATTRIBUTES			
AVERAGE WATER APPEARANCE:	Clear		
PRIMARY SUBSTRATE:	Cobbles		
POTENTIAL HABITAT FOR:	Unknown		
RIPARIAN ZONE:	WIDTH OF NATURAL VEGETATION ZONE FROM EDGE OF ACTIVE CHANNEL OUT ONTO FLOOD PLAIN: 50 (ft) TYPE OF VEGETATION PRESENT: Forested		
WETLAND FRINGE (IF PRESENT):	Yes, PFO		
CHANNEL CONDITION:	No significant erosion		
CHANNEL TYPE:	Natural	CHANNEL GEOMETRY: Relatively Straight	
COMMENTS			
STREAM QUALITY: Moderate quality			
<p>HIGH QUALITY: Natural channel (no structures or dikes; no evidence of downcutting or excessive lateral cutting); evidence of past channel alteration with significant recovery; any dikes/levees are set back to provide access to adequate flood plain; natural vegetation extends at least one or two active channel widths on each side; banks stable and protected by roots that extend to the base-flow elevation; water clear to tea-colored; no barriers to fish movement (seasonal water withdrawals prevent movement); many fish cover types available; diverse and stable aquatic habitat; no disturbance by livestock or man; intolerant macroinvertebrates present.</p> <p>MODERATE QUALITY: Altered channel evidenced by rip rap and/or channelization; dikes/levees restrict flood plain width; natural vegetation extends 1/3-1/2 of the active channel width on each side; filtering function of riparian vegetation only moderately compromised; banks moderately unstable (outside bends actively eroding with few fallen trees); considerable water cloudiness, submerged objects covered with green film; moderate odor; minor barriers to fish movement; 4-3 fish cover types available; fair aquatic habitat; minimum disturbance by livestock or man; Facultative macroinvertebrates present.</p> <p>LOW QUALITY: Channel is actively downcutting or widening; rip rap and channelization excessive; flood plain restricted by dikes/levees; natural vegetation less than 1/3 of the active channel width on each side; lack of regeneration; filtering function severely compromised; Banks unstable (inside and outside bends actively eroding with numerous fallen trees); water very turbid to muddy; obvious pollutants (algal mats, surface scum, surface sheen); heavy odor; green color to water; severe barriers to fish movement; 2-0 fish cover types available; little to no aquatic habitat; severe disturbance by livestock or man; tolerant or no macroinvertebrates present.</p>			

WATERBODY DATA FORM

WATERBODY ID No.: S-KD-002	WATERBODY NAME: Unnamed Tributary to Big Hunting Creek
SURVEY TYPE: Utility	
DATE: 12/14/2020	CLIENT/PROJECT NAME: NPS/PROJECT CATO
INVESTIGATORS: BC, KD, RW, LP	ROVER FILE: KD_121420.SSF
STATE/COUNTY: Frederick County, MD	QUAD NAME: Blue Ridge Summit, PA, MD

WATERBODY CHARACTERISTICS

WATERBODY TYPE:	Stream		
FLOW EVENTS/YEAR:	NA		
FLOW TYPE:	Ephemeral		
AVG. STREAM DEPTH:	<1 (in)		
AVG. STREAM WIDTH (WATER SURFACE):	1 (ft)	TOP OF BANK (AT CROSSING LOCATION): 3 (ft)	ORDINARY HIGH WATER MARK WIDTH (AT CROSSING LOCATION): 1 (ft)
ORDINARY HIGH WATER MARK INDICATORS:	Sediment sorting		
AVG. BANK HEIGHT:	1 (ft)		
AVG. BANK SLOPE (RATIO):	2:1		

QUALITATIVE ATTRIBUTES

AVERAGE WATER APPEARANCE:	Clear		
PRIMARY SUBSTRATE:	Cobbles		
POTENTIAL HABITAT FOR:	Unknown		
RIPARIAN ZONE:	WIDTH OF NATURAL VEGETATION ZONE FROM EDGE OF ACTIVE CHANNEL OUT ONTO FLOOD PLAIN: 50 (ft) TYPE OF VEGETATION PRESENT: Forested		
WETLAND FRINGE (IF PRESENT):	No.		
CHANNEL CONDITION:	No significant erosion		
CHANNEL TYPE:	Natural	CHANNEL GEOMETRY: Relatively Straight	

COMMENTS

STREAM QUALITY: Moderate quality

HIGH QUALITY: Natural channel (no structures or dikes; no evidence of downcutting or excessive lateral cutting); evidence of past channel alteration with significant recovery; any dikes/levees are set back to provide access to adequate flood plain; natural vegetation extends at least one or two active channel widths on each side; banks stable and protected by roots that extend to the base-flow elevation; water clear to tea-colored; no barriers to fish movement (seasonal water withdrawals prevent movement); many fish cover types available; diverse and stable aquatic habitat; no disturbance by livestock or man; intolerant macroinvertebrates present.

MODERATE QUALITY: Altered channel evidenced by rip rap and/or channelization; dikes/levees restrict flood plain width; natural vegetation extends 1/3-1/2 of the active channel width on each side; filtering function of riparian vegetation only moderately compromised; banks moderately unstable (outside bends actively eroding with few fallen trees); considerable water cloudiness, submerged objects covered with green film; moderate odor; minor barriers to fish movement; 4-3 fish cover types available; fair aquatic habitat; minimum disturbance by livestock or man; Facultative macroinvertebrates present.

LOW QUALITY: Channel is actively downcutting or widening; rip rap and channelization excessive; flood plain restricted by dikes/levees; natural vegetation less than 1/3 of the active channel width on each side; lack of regeneration; filtering function severely compromised; Banks unstable (inside and outside bends actively eroding with numerous fallen trees); water very turbid to muddy; obvious pollutants (algal mats, surface scum, surface sheen); heavy odor; green color to water; severe barriers to fish movement; 2-0 fish cover types available; little to no aquatic habitat; severe disturbance by livestock or man; tolerant or no macroinvertebrates present.

WATERBODY DATA FORM

WATERBODY ID No.: S-KD-003		WATERBODY NAME: Unnamed Tributary to Big Hunting Creek	
SURVEY TYPE: Utility			
DATE: 12/14/2020		CLIENT/PROJECT NAME: NPS/PROJECT CATO	
INVESTIGATORS: BC, KD, RW, LP		ROVER FILE: KD_121420.SSF	
STATE/COUNTY: Frederick County, MD		QUAD NAME: Blue Ridge Summit, PA, MD	
WATERBODY CHARACTERISTICS			
WATERBODY TYPE:	Stream		
FLOW EVENTS/YEAR:	NA		
FLOW TYPE:	Perennial		
AVG. STREAM DEPTH:	2 (in.)		
AVG. STREAM WIDTH (WATER SURFACE):	4 (ft)	TOP OF BANK (AT CROSSING LOCATION): 8 (ft)	ORDINARY HIGH WATER MARK WIDTH (AT CROSSING LOCATION): 4 (ft)
ORDINARY HIGH WATER MARK INDICATORS:	Sediment sorting, soil characteristic change, shelving		
AVG. BANK HEIGHT:	2 (ft)		
AVG. BANK SLOPE (RATIO):	2:1		
QUALITATIVE ATTRIBUTES			
AVERAGE WATER APPEARANCE:	Clear		
PRIMARY SUBSTRATE:	Cobble and gravel		
POTENTIAL HABITAT FOR:	Potential macroinvertebrate habitat, but none observed during survey.		
RIPARIAN ZONE:	WIDTH OF NATURAL VEGETATION ZONE FROM EDGE OF ACTIVE CHANNEL OUT ONTO FLOOD PLAIN: 50 (ft) TYPE OF VEGETATION PRESENT: Forested		
WETLAND FRINGE (IF PRESENT):	No		
CHANNEL CONDITION:	No significant erosion		
CHANNEL TYPE:	Natural	CHANNEL GEOMETRY: Relatively Straight	
COMMENTS			
Culverted under Maintenance Drive.			
STREAM QUALITY: Moderate quality			
<p>HIGH QUALITY: Natural channel (no structures or dikes; no evidence of downcutting or excessive lateral cutting); evidence of past channel alteration with significant recovery; any dikes/levees are set back to provide access to adequate flood plain; natural vegetation extends at least one or two active channel widths on each side; banks stable and protected by roots that extend to the base-flow elevation; water clear to tea-colored; no barriers to fish movement (seasonal water withdrawals prevent movement); many fish cover types available; diverse and stable aquatic habitat; no disturbance by livestock or man; intolerant macroinvertebrates present.</p> <p>MODERATE QUALITY: Altered channel evidenced by rip rap and/or channelization; dikes/levees restrict flood plain width; natural vegetation extends 1/3-1/2 of the active channel width on each side; filtering function of riparian vegetation only moderately compromised; banks moderately unstable (outside bends actively eroding with few fallen trees); considerable water cloudiness, submerged objects covered with green film; moderate odor; minor barriers to fish movement; 4-3 fish cover types available; fair aquatic habitat; minimum disturbance by livestock or man; Facultative macroinvertebrates present.</p> <p>LOW QUALITY: Channel is actively downcutting or widening; rip rap and channelization excessive; flood plain restricted by dikes/levees; natural vegetation less than 1/3 of the active channel width on each side; lack of regeneration; filtering function severely compromised; Banks unstable (inside and outside bends actively eroding with numerous fallen trees); water very turbid to muddy; obvious pollutants (algal mats, surface scum, surface sheen); heavy odor; green color to water; severe barriers to fish movement; 2-0 fish cover types available; little to no aquatic habitat; severe disturbance by livestock or man; tolerant or no macroinvertebrates present.</p>			

WATERBODY DATA FORM

WATERBODY ID No.: S-KD-004		WATERBODY NAME: Unnamed Tributary to Big Hunting Creek	
SURVEY TYPE: Utility			
DATE: 12/14/2020		CLIENT/PROJECT NAME: NPS/PROJECT CATO	
INVESTIGATORS: BC, KD, RW, LP		ROVER FILE: KD_121420.SSF	
STATE/COUNTY: Frederick County, MD		QUAD NAME: Blue Ridge Summit, PA, MD	
WATERBODY CHARACTERISTICS			
WATERBODY TYPE:	Stream		
FLOW EVENTS/YEAR:	NA		
FLOW TYPE:	Perennial		
AVG. STREAM DEPTH:	2 (in.)		
AVG. STREAM WIDTH (WATER SURFACE):	5 (ft)	TOP OF BANK (AT CROSSING LOCATION): 8 (ft)	ORDINARY HIGH WATER MARK WIDTH (AT CROSSING LOCATION): 5 (ft)
ORDINARY HIGH WATER MARK INDICATORS:	Sediment sorting, soil characteristic change, shelving		
AVG. BANK HEIGHT:	1 (ft)		
AVG. BANK SLOPE (RATIO):	2:1		
QUALITATIVE ATTRIBUTES			
AVERAGE WATER APPEARANCE:	Clear		
PRIMARY SUBSTRATE:	Cobble and gravel		
POTENTIAL HABITAT FOR:	Potential macroinvertebrate habitat, but none observed during survey.		
RIPARIAN ZONE:	WIDTH OF NATURAL VEGETATION ZONE FROM EDGE OF ACTIVE CHANNEL OUT ONTO FLOOD PLAIN: 50 (ft) TYPE OF VEGETATION PRESENT: Forested		
WETLAND FRINGE (IF PRESENT):	Yes, PFO		
CHANNEL CONDITION:	No significant erosion		
CHANNEL TYPE:	Natural	CHANNEL GEOMETRY: Relatively Straight	
COMMENTS			
Culverted under Misty Mount Road.			
STREAM QUALITY: Moderate quality			
<p>HIGH QUALITY: Natural channel (no structures or dikes; no evidence of downcutting or excessive lateral cutting); evidence of past channel alteration with significant recovery; any dikes/levees are set back to provide access to adequate flood plain; natural vegetation extends at least one or two active channel widths on each side; banks stable and protected by roots that extend to the base-flow elevation; water clear to tea-colored; no barriers to fish movement (seasonal water withdrawals prevent movement); many fish cover types available; diverse and stable aquatic habitat; no disturbance by livestock or man; intolerant macroinvertebrates present.</p> <p>MODERATE QUALITY: Altered channel evidenced by rip rap and/or channelization; dikes/levees restrict flood plain width; natural vegetation extends 1/3-1/2 of the active channel width on each side; filtering function of riparian vegetation only moderately compromised; banks moderately unstable (outside bends actively eroding with few fallen trees); considerable water cloudiness, submerged objects covered with green film; moderate odor; minor barriers to fish movement; 4-3 fish cover types available; fair aquatic habitat; minimum disturbance by livestock or man; Facultative macroinvertebrates present.</p> <p>LOW QUALITY: Channel is actively downcutting or widening; rip rap and channelization excessive; flood plain restricted by dikes/levees; natural vegetation less than 1/3 of the active channel width on each side; lack of regeneration; filtering function severely compromised; Banks unstable (inside and outside bends actively eroding with numerous fallen trees); water very turbid to muddy; obvious pollutants (algal mats, surface scum, surface sheen); heavy odor; green color to water; severe barriers to fish movement; 2-0 fish cover types available; little to no aquatic habitat; severe disturbance by livestock or man; tolerant or no macroinvertebrates present.</p>			

WATERBODY DATA FORM

WATERBODY ID No.: S-KD-005		WATERBODY NAME: Owens Creek	
SURVEY TYPE: Utility			
DATE: 12/14/2020		CLIENT/PROJECT NAME: NPS/PROJECT CATO	
INVESTIGATORS: BC, KD, RW, LP		ROVER FILE: KD_121420.SSF	
STATE/COUNTY: Frederick County, MD		QUAD NAME: Blue Ridge Summit, PA, MD	
WATERBODY CHARACTERISTICS			
WATERBODY TYPE:	Stream		
FLOW EVENTS/YEAR:	NA		
FLOW TYPE:	Perennial		
AVG. STREAM DEPTH:	2 (in.)		
AVG. STREAM WIDTH (WATER SURFACE):	20 (ft)	TOP OF BANK (AT CROSSING LOCATION): 25 (ft)	ORDINARY HIGH WATER MARK WIDTH (AT CROSSING LOCATION): 20 (ft)
ORDINARY HIGH WATER MARK INDICATORS:	Sediment sorting, soil characteristic change, shelving, clear natural line on bank		
AVG. BANK HEIGHT:	2 (ft)		
AVG. BANK SLOPE (RATIO):	1:1		
QUALITATIVE ATTRIBUTES			
AVERAGE WATER APPEARANCE:	Clear		
PRIMARY SUBSTRATE:	Cobble and gravel		
POTENTIAL HABITAT FOR:	Potential macroinvertebrate habitat, but none observed during survey.		
RIPARIAN ZONE:	WIDTH OF NATURAL VEGETATION ZONE FROM EDGE OF ACTIVE CHANNEL OUT ONTO FLOOD PLAIN: 50 (ft) TYPE OF VEGETATION PRESENT: Forested		
WETLAND FRINGE (IF PRESENT):	Yes, PFO		
CHANNEL CONDITION:	No significant erosion		
CHANNEL TYPE:	Natural	CHANNEL GEOMETRY: Relatively Straight	
COMMENTS			
STREAM QUALITY: Moderate quality			
<p>HIGH QUALITY: Natural channel (no structures or dikes; no evidence of downcutting or excessive lateral cutting); evidence of past channel alteration with significant recovery; any dikes/levees are set back to provide access to adequate flood plain; natural vegetation extends at least one or two active channel widths on each side; banks stable and protected by roots that extend to the base-flow elevation; water clear to tea-colored; no barriers to fish movement (seasonal water withdrawals prevent movement); many fish cover types available; diverse and stable aquatic habitat; no disturbance by livestock or man; intolerant macroinvertebrates present.</p> <p>MODERATE QUALITY: Altered channel evidenced by rip rap and/or channelization; dikes/levees restrict flood plain width; natural vegetation extends 1/3-1/2 of the active channel width on each side; filtering function of riparian vegetation only moderately compromised; banks moderately unstable (outside bends actively eroding with few fallen trees); considerable water cloudiness, submerged objects covered with green film; moderate odor; minor barriers to fish movement; 4-3 fish cover types available; fair aquatic habitat; minimum disturbance by livestock or man; Facultative macroinvertebrates present.</p> <p>LOW QUALITY: Channel is actively downcutting or widening; rip rap and channelization excessive; flood plain restricted by dikes/levees; natural vegetation less than 1/3 of the active channel width on each side; lack of regeneration; filtering function severely compromised; Banks unstable (inside and outside bends actively eroding with numerous fallen trees); water very turbid to muddy; obvious pollutants (algal mats, surface scum, surface sheen); heavy odor; green color to water; severe barriers to fish movement; 2-0 fish cover types available; little to no aquatic habitat; severe disturbance by livestock or man; tolerant or no macroinvertebrates present.</p>			

WATERBODY DATA FORM

WATERBODY ID No.: S-KD-006		WATERBODY NAME: Tributary to Owens Creek	
SURVEY TYPE: Utility			
DATE: 12/14/2020		CLIENT/PROJECT NAME: NPS/PROJECT CATO	
INVESTIGATORS: BC, KD, RW, LP		ROVER FILE: KD_121420.SSF	
STATE/COUNTY: Frederick County, MD		QUAD NAME: Blue Ridge Summit, PA, MD	
WATERBODY CHARACTERISTICS			
WATERBODY TYPE:	Stream		
FLOW EVENTS/YEAR:	NA		
FLOW TYPE:	Intermittent		
AVG. STREAM DEPTH:	1 (in.)		
AVG. STREAM WIDTH (WATER SURFACE):	10 (ft)	TOP OF BANK (AT CROSSING LOCATION): 12 (ft)	ORDINARY HIGH WATER MARK WIDTH (AT CROSSING LOCATION): 10 (ft)
ORDINARY HIGH WATER MARK INDICATORS:	Sediment sorting, soil characteristic change, shelving, clear natural line on bank		
AVG. BANK HEIGHT:	1 (ft)		
AVG. BANK SLOPE (RATIO):	2:1		
QUALITATIVE ATTRIBUTES			
AVERAGE WATER APPEARANCE:	Clear		
PRIMARY SUBSTRATE:	Gravel		
POTENTIAL HABITAT FOR:	Potentially macroinvertebrate habitat, but none observed during survey.		
RIPARIAN ZONE:	WIDTH OF NATURAL VEGETATION ZONE FROM EDGE OF ACTIVE CHANNEL OUT ONTO FLOOD PLAIN: 50 (ft) TYPE OF VEGETATION PRESENT: Forested		
WETLAND FRINGE (IF PRESENT):	Yes, PFO		
CHANNEL CONDITION:	No significant erosion		
CHANNEL TYPE:	Natural	CHANNEL GEOMETRY: Relatively Straight	
COMMENTS			
STREAM QUALITY: Moderate quality			
<p>HIGH QUALITY: Natural channel (no structures or dikes; no evidence of downcutting or excessive lateral cutting); evidence of past channel alteration with significant recovery; any dikes/levees are set back to provide access to adequate flood plain; natural vegetation extends at least one or two active channel widths on each side; banks stable and protected by roots that extend to the base-flow elevation; water clear to tea-colored; no barriers to fish movement (seasonal water withdrawals prevent movement); many fish cover types available; diverse and stable aquatic habitat; no disturbance by livestock or man; intolerant macroinvertebrates present.</p> <p>MODERATE QUALITY: Altered channel evidenced by rip rap and/or channelization; dikes/levees restrict flood plain width; natural vegetation extends 1/3-1/2 of the active channel width on each side; filtering function of riparian vegetation only moderately compromised; banks moderately unstable (outside bends actively eroding with few fallen trees); considerable water cloudiness, submerged objects covered with green film; moderate odor; minor barriers to fish movement; 4-3 fish cover types available; fair aquatic habitat; minimum disturbance by livestock or man; Facultative macroinvertebrates present.</p> <p>LOW QUALITY: Channel is actively downcutting or widening; rip rap and channelization excessive; flood plain restricted by dikes/levees; natural vegetation less than 1/3 of the active channel width on each side; lack of regeneration; filtering function severely compromised; Banks unstable (inside and outside bends actively eroding with numerous fallen trees); water very turbid to muddy; obvious pollutants (algal mats, surface scum, surface sheen); heavy odor; green color to water; severe barriers to fish movement; 2-0 fish cover types available; little to no aquatic habitat; severe disturbance by livestock or man; tolerant or no macroinvertebrates present.</p>			

WATERBODY DATA FORM

WATERBODY ID No.: S-KD-007	WATERBODY NAME: Tributary to Owens Creek
SURVEY TYPE: Utility	
DATE: 12/15/2020	CLIENT/PROJECT NAME: NPS/PROJECT CATO
INVESTIGATORS: BC, KD, RW, LP	ROVER FILE: KD_121520.SSF
STATE/COUNTY: Frederick County, MD	QUAD NAME: Blue Ridge Summit, PA, MD

WATERBODY CHARACTERISTICS

WATERBODY TYPE:	Stream		
FLOW EVENTS/YEAR:	NA		
FLOW TYPE:	Ephemeral		
AVG. STREAM DEPTH:	0 (in.)		
AVG. STREAM WIDTH (WATER SURFACE):	0 (ft)	TOP OF BANK (AT CROSSING LOCATION): 3 (ft)	ORDINARY HIGH WATER MARK WIDTH (AT CROSSING LOCATION): 1 (ft)
ORDINARY HIGH WATER MARK INDICATORS:	Sloughing banks		
AVG. BANK HEIGHT:	2 (ft)		
AVG. BANK SLOPE (RATIO):	3:1		

QUALITATIVE ATTRIBUTES

AVERAGE WATER APPEARANCE:	None		
PRIMARY SUBSTRATE:	Silts		
POTENTIAL HABITAT FOR:	None		
RIPARIAN ZONE:	WIDTH OF NATURAL VEGETATION ZONE FROM EDGE OF ACTIVE CHANNEL OUT ONTO FLOOD PLAIN: 3 (ft) TYPE OF VEGETATION PRESENT: Forested and portion roadside		
WETLAND FRINGE (IF PRESENT):	No		
CHANNEL CONDITION:	No significant erosion		
CHANNEL TYPE:	Ditch	CHANNEL GEOMETRY: Relatively Straight	

COMMENTS

Roadside ditch that leads into the woods. Culverted under Manahan Road.

STREAM QUALITY: Low quality

HIGH QUALITY: Natural channel (no structures or dikes; no evidence of downcutting or excessive lateral cutting); evidence of past channel alteration with significant recovery; any dikes/levies are set back to provide access to adequate flood plain; natural vegetation extends at least one or two active channel widths on each side; banks stable and protected by roots that extend to the base-flow elevation; water clear to tea-colored; no barriers to fish movement (seasonal water withdrawals prevent movement); many fish cover types available; diverse and stable aquatic habitat; no disturbance by livestock or man; intolerant macroinvertebrates present.

MODERATE QUALITY: Altered channel evidenced by rip rap and/or channelization; dikes/levees restrict flood plain width; natural vegetation extends 1/3-1/2 of the active channel width on each side; filtering function of riparian vegetation only moderately compromised; banks moderately unstable (outside bends actively eroding with few fallen trees); considerable water cloudiness, submerged objects covered with green film; moderate odor; minor barriers to fish movement; 4-3 fish cover types available; fair aquatic habitat; minimum disturbance by livestock or man; Facultative macroinvertebrates present.

LOW QUALITY: Channel is actively downcutting or widening; rip rap and channelization excessive; flood plain restricted by dikes/levees; natural vegetation less than 1/3 of the active channel width on each side; lack of regeneration; filtering function severely compromised; Banks unstable (inside and outside bends actively eroding with numerous fallen trees); water very turbid to muddy; obvious pollutants (algal mats, surface scum, surface sheen); heavy odor; green color to water; severe barriers to fish movement; 2-0 fish cover types available; little to no aquatic habitat; severe disturbance by livestock or man; tolerant or no macroinvertebrates present.

WATERBODY DATA FORM

WATERBODY ID No.: S-KD-008		WATERBODY NAME: Unnamed Tributary to Owens Creek	
SURVEY TYPE: Utility			
DATE: 01/07/21		CLIENT/PROJECT NAME: NPS/ PROJECT CATO	
INVESTIGATORS: KD, LP		ROVER FILE: R010707A.SSF	
STATE/COUNTY: Frederick County, MD		QUAD NAME: Blue Ridge Summit, PA, MD	
WATERBODY CHARACTERISTICS			
WATERBODY TYPE:	Stream		
FLOW EVENTS/YEAR:	NA		
FLOW TYPE:	Perennial		
AVG. STREAM DEPTH:	3-4 (in)		
AVG. STREAM WIDTH (WATER SURFACE):	2 (ft)	TOP OF BANK (AT CROSSING LOCATION): 4 (ft)	ORDINARY HIGH WATER MARK WIDTH (AT CROSSING LOCATION): 3 (ft)
ORDINARY HIGH WATER MARK INDICATORS:	Stained vegetation		
AVG. BANK HEIGHT:	0.3 (ft)		
AVG. BANK SLOPE (RATIO):	1.5:1		
QUALITATIVE ATTRIBUTES			
AVERAGE WATER APPEARANCE:	Clear		
PRIMARY SUBSTRATE:	Rocks, Cobbles, Gravel		
POTENTIAL HABITAT FOR:	Frogs aquatic invertebrates, aquatic vegetation (watercress is present)		
RIPARIAN ZONE:	WIDTH OF NATURAL VEGETATION ZONE FROM EDGE OF ACTIVE CHANNEL OUT ONTO FLOOD PLAIN: >50 (ft)		
	TYPE OF VEGETATION PRESENT: Forested (trees, shrubs, herbaceous)		
WETLAND FRINGE (IF PRESENT):	Yes, PFO		
CHANNEL CONDITION:	No significant erosion, healthy		
CHANNEL TYPE:	Natural	CHANNEL GEOMETRY: U-shaped and slightly sinuous	
COMMENTS			
Utility crossing just downstream of headwaters of stream. This stream is associated with wetland W-KD-004.			
STREAM QUALITY: High quality			
<p>HIGH QUALITY: Natural channel (no structures or dikes; no evidence of downcutting or excessive lateral cutting); evidence of past channel alteration with significant recovery; any dikes/levees are set back to provide access to adequate flood plain; natural vegetation extends at least one or two active channel widths on each side; banks stable and protected by roots that extend to the base-flow elevation; water clear to tea-colored; no barriers to fish movement (seasonal water withdrawals prevent movement); many fish cover types available; diverse and stable aquatic habitat; no disturbance by livestock or man; intolerant macroinvertebrates present.</p> <p>MODERATE QUALITY: Altered channel evidenced by rip rap and/or channelization; dikes/levees restrict flood plain width; natural vegetation extends 1/3-1/2 of the active channel width on each side; filtering function of riparian vegetation only moderately compromised; banks moderately unstable (outside bends actively eroding with few fallen trees); considerable water cloudiness, submerged objects covered with green film; moderate odor; minor barriers to fish movement; 4-3 fish cover types available; fair aquatic habitat; minimum disturbance by livestock or man; Facultative macroinvertebrates present.</p> <p>LOW QUALITY: Channel is actively downcutting or widening; rip rap and channelization excessive; flood plain restricted by dikes/levees; natural vegetation less than 1/3 of the active channel width on each side; lack of regeneration; filtering function severely compromised; Banks unstable (inside and outside bends actively eroding with numerous fallen trees); water very turbid to muddy; obvious pollutants (algal mats, surface scum, surface sheen); heavy odor; green color to water; severe barriers to fish movement; 2-0 fish cover types available; little to no aquatic habitat; severe disturbance by livestock or man; tolerant or no macroinvertebrates present.</p>			

WATERBODY DATA FORM

WATERBODY ID No.: S-KD-009		WATERBODY NAME: Unnamed Tributary to Owens Creek	
SURVEY TYPE: Utility			
DATE: 01/08/21		CLIENT/PROJECT NAME: NPS/ PROJECT CATO	
INVESTIGATORS: KD, LP		ROVER FILE: R010807A.SSF	
STATE/COUNTY: Frederick County, MD		QUAD NAME: Blue Ridge Summit, PA, MD	
WATERBODY CHARACTERISTICS			
WATERBODY TYPE:	Stream		
FLOW EVENTS/YEAR:	NA		
FLOW TYPE:	Perennial		
AVG. STREAM DEPTH:	2 (in)		
AVG. STREAM WIDTH (WATER SURFACE):	2 (ft)	TOP OF BANK (AT CROSSING LOCATION): 3 (ft)	ORDINARY HIGH WATER MARK WIDTH (AT CROSSING LOCATION): 3 (ft)
ORDINARY HIGH WATER MARK INDICATORS:	Stained vegetation		
AVG. BANK HEIGHT:	1 (ft)		
AVG. BANK SLOPE (RATIO):	1:5		
QUALITATIVE ATTRIBUTES			
AVERAGE WATER APPEARANCE:	Clear		
PRIMARY SUBSTRATE:	Rocks and Gravel		
POTENTIAL HABITAT FOR:	Frogs, aquatic vegetation		
RIPARIAN ZONE:	WIDTH OF NATURAL VEGETATION ZONE FROM EDGE OF ACTIVE CHANNEL OUT ONTO FLOOD PLAIN: 15 (ft) TYPE OF VEGETATION PRESENT: Maintained road shoulder and forested (trees, shrubs, herbaceous)		
WETLAND FRINGE (IF PRESENT):	Yes, PFO on western bank		
CHANNEL CONDITION:	No significant erosion, healthy		
CHANNEL TYPE:	Natural	CHANNEL GEOMETRY: Flat U-shaped and slightly sinuous	
COMMENTS			
<p>The majority of the stream in the survey area parallels Park Central Road. Its right bank does not have a natural vegetation buffer as it is presently maintained in mowed state due to its proximity to Park Central Road. The stream is located less than 15 feet from the roadway in most places along its length in the survey area. This stream is also very close to the eastern boundary of Camp 3.</p>			
STREAM QUALITY: High quality – Other than proximity to roadway, stream quality seems high.			
<p>HIGH QUALITY: Natural channel (no structures or dikes; no evidence of downcutting or excessive lateral cutting); evidence of past channel alteration with significant recovery; any dikes/levies are set back to provide access to adequate flood plain; natural vegetation extends at least one or two active channel widths on each side; banks stable and protected by roots that extend to the base-flow elevation; water clear to tea-colored; no barriers to fish movement (seasonal water withdrawals prevent movement); many fish cover types available; diverse and stable aquatic habitat; no disturbance by livestock or man; intolerant macroinvertebrates present.</p> <p>MODERATE QUALITY: Altered channel evidenced by rip rap and/or channelization; dikes/levees restrict flood plain width; natural vegetation extends 1/3-1/2 of the active channel width on each side; filtering function of riparian vegetation only moderately compromised; banks moderately unstable (outside bends actively eroding with few fallen trees); considerable water cloudiness, submerged objects covered with green film; moderate odor; minor barriers to fish movement; 4-3 fish cover types available; fair aquatic habitat; minimum disturbance by livestock or man; Facultative macroinvertebrates present.</p> <p>LOW QUALITY: Channel is actively downcutting or widening; rip rap and channelization excessive; flood plain restricted by dikes/levees; natural vegetation less than 1/3 of the active channel width on each side; lack of regeneration; filtering function severely compromised; Banks unstable (inside and outside bends actively eroding with numerous fallen trees); water very turbid to muddy; obvious pollutants (algal mats, surface scum, surface sheen); heavy odor; green color to water; severe barriers to fish movement; 2-0 fish cover types available; little to no aquatic habitat; severe disturbance by livestock or man; tolerant or no macroinvertebrates present.</p>			

WATERBODY DATA FORM

WATERBODY ID No.: S-KD-010		WATERBODY NAME: Unnamed Tributary to Big Hunting Creek	
SURVEY TYPE: Utility			
DATE: 01/08/21		CLIENT/PROJECT NAME: NPS/ PROJECT CATO	
INVESTIGATORS: KD, LP		ROVER FILE: R010807A.SSF	
STATE/COUNTY: Frederick County, MD		QUAD NAME: Blue Ridge Summit, PA, MD	
WATERBODY CHARACTERISTICS			
WATERBODY TYPE:	Stream		
FLOW EVENTS/YEAR:	NA		
FLOW TYPE:	Intermittent		
AVG. STREAM DEPTH:	3 (in)		
AVG. STREAM WIDTH (WATER SURFACE):	2 (ft)	TOP OF BANK (AT CROSSING LOCATION): 2 (ft)	ORDINARY HIGH WATER MARK WIDTH (AT CROSSING LOCATION): 2 (ft)
ORDINARY HIGH WATER MARK INDICATORS:	Stained vegetation, drainage patterns		
AVG. BANK HEIGHT:	0.25 (ft)		
AVG. BANK SLOPE (RATIO):	1:1.5		
QUALITATIVE ATTRIBUTES			
AVERAGE WATER APPEARANCE:	Clear		
PRIMARY SUBSTRATE:	Gravel and Silt		
POTENTIAL HABITAT FOR:	Frogs		
RIPARIAN ZONE:	WIDTH OF NATURAL VEGETATION ZONE FROM EDGE OF ACTIVE CHANNEL OUT ONTO FLOOD PLAIN: (ft) 20 feet on east side; > than 50 on the west side TYPE OF VEGETATION PRESENT: Maintained road shoulder and forested (trees, shrubs, herbaceous)		
WETLAND FRINGE (IF PRESENT):	No		
CHANNEL CONDITION:	Shows signs of flash storm events (erosion, piles of leaf litter and debris, loses defined channel downstream of the data point location.		
CHANNEL TYPE:	Shallow stream / swale	CHANNEL GEOMETRY: Flat U-shaped	
COMMENTS			
<p>The feature is located near the Visitor Center/Maintenance Area and appears to receive diverted stormwater flow and runoff from a constructed parking area. Groundwater discharges into channel upstream, but the channel loses defined bed and banks further downstream of the datapoint.</p>			
STREAM QUALITY: High quality - Other than proximity to Maintenance roadway, stream quality seems high.			
<p>HIGH QUALITY: Natural channel (no structures or dikes; no evidence of downcutting or excessive lateral cutting); evidence of past channel alteration with significant recovery; any dikes/levees are set back to provide access to adequate flood plain; natural vegetation extends at least one or two active channel widths on each side; banks stable and protected by roots that extend to the base-flow elevation; water clear to tea-colored; no barriers to fish movement (seasonal water withdrawals prevent movement); many fish cover types available; diverse and stable aquatic habitat; no disturbance by livestock or man; intolerant macroinvertebrates present.</p> <p>MODERATE QUALITY: Altered channel evidenced by rip rap and/or channelization; dikes/levees restrict flood plain width; natural vegetation extends 1/3-1/2 of the active channel width on each side; filtering function of riparian vegetation only moderately compromised; banks moderately unstable (outside bends actively eroding with few fallen trees); considerable water cloudiness, submerged objects covered with green film; moderate odor; minor barriers to fish movement; 4-3 fish cover types available; fair aquatic habitat; minimum disturbance by livestock or man; Facultative macroinvertebrates present.</p> <p>LOW QUALITY: Channel is actively downcutting or widening; rip rap and channelization excessive; flood plain restricted by dikes/levees; natural vegetation less than 1/3 of the active channel width on each side; lack of regeneration; filtering function severely compromised; Banks unstable (inside and outside bends actively eroding with numerous fallen trees); water very turbid to muddy; obvious pollutants (algal mats, surface scum, surface sheen); heavy odor; green color to water; severe barriers to fish movement; 2-0 fish cover types available; little to no aquatic habitat; severe disturbance by livestock or man; tolerant or no macroinvertebrates present.</p>			

WATERBODY DATA FORM

WATERBODY ID No.: S-RR-001		WATERBODY NAME: Unnamed Tributary to Blue Blazes Run	
SURVEY TYPE: Utility			
DATE: 05/04/2021		CLIENT/PROJECT NAME: NPS/PROJECT CATO	
INVESTIGATORS: RR, LP		ROVER FILE: SSS_FieldSurvey	
STATE/COUNTY: Frederick County, MD		QUAD NAME: Blue Ridge Summit, PA, MD	
WATERBODY CHARACTERISTICS			
WATERBODY TYPE:	Stream		
FLOW EVENTS/YEAR:	NA		
FLOW TYPE:	Intermittent		
AVG. STREAM DEPTH:	1 (in)		
AVG. STREAM WIDTH (WATER SURFACE):	1 (ft)	TOP OF BANK (AT CROSSING LOCATION): 3 (ft)	ORDINARY HIGH WATER MARK WIDTH (AT CROSSING LOCATION): 1 (ft)
ORDINARY HIGH WATER MARK INDICATORS:	Sediment sorting		
AVG. BANK HEIGHT:	0.5 (ft)		
AVG. BANK SLOPE (RATIO):	2:1		
QUALITATIVE ATTRIBUTES			
AVERAGE WATER APPEARANCE:	Clear		
PRIMARY SUBSTRATE:	Cobble, Boulders		
POTENTIAL HABITAT FOR:	Unknown		
RIPARIAN ZONE:	WIDTH OF NATURAL VEGETATION ZONE FROM EDGE OF ACTIVE CHANNEL OUT ONTO FLOOD PLAIN: 50 ft.		
	TYPE OF VEGETATION PRESENT: Forested		
WETLAND FRINGE (IF PRESENT):	No		
CHANNEL CONDITION:	No significant erosion		
CHANNEL TYPE:	Natural	CHANNEL GEOMETRY: Straight	
COMMENTS			
STREAM QUALITY: Moderate quality			
<p>HIGH QUALITY: Natural channel (no structures or dikes; no evidence of downcutting or excessive lateral cutting); evidence of past channel alteration with significant recovery; any dikes/levies are set back to provide access to adequate flood plain; natural vegetation extends at least one or two active channel widths on each side; banks stable and protected by roots that extend to the base-flow elevation; water clear to tea-colored; no barriers to fish movement (seasonal water withdrawals prevent movement); many fish cover types available; diverse and stable aquatic habitat; no disturbance by livestock or man; intolerant macroinvertebrates present.</p> <p>MODERATE QUALITY: Altered channel evidenced by rip rap and/or channelization; dikes/levees restrict flood plain width; natural vegetation extends 1/3-1/2 of the active channel width on each side; filtering function of riparian vegetation only moderately compromised; banks moderately unstable (outside bends actively eroding with few fallen trees); considerable water cloudiness, submerged objects covered with green film; moderate odor; minor barriers to fish movement; 4-3 fish cover types available; fair aquatic habitat; minimum disturbance by livestock or man; Facultative macroinvertebrates present.</p> <p>LOW QUALITY: Channel is actively downcutting or widening; rip rap and channelization excessive; flood plain restricted by dikes/levees; natural vegetation less than 1/3 of the active channel width on each side; lack of regeneration; filtering function severely compromised; Banks unstable (inside and outside bends actively eroding with numerous fallen trees); water very turbid to muddy; obvious pollutants (algal mats, surface scum, surface sheen); heavy odor; green color to water; severe barriers to fish movement; 2-0 fish cover types available; little to no aquatic habitat; severe disturbance by livestock or man; tolerant or no macroinvertebrates present.</p>			



Appendix E – Maryland Department of Natural Resources Stream Health Data Sheets

Stream Health Data Sheet

Record information on this sheet as you conduct assessments to determine overall health of your stream. There are three stream assessments for this investigation: (1) **physical**, rating the condition of the stream habitat based on observable characteristics; (2) **biological**, using living animals present to indicate stream health; and (3) **chemical**, testing the water quality based on the chemical content of the stream. Use all three to get a more thorough rating of your stream's health. You may share your findings and compare data with others on the [Maryland Student Stream Health](#) map.

Stream Site and Stream Investigator's Information

Name (Teacher / Observer) BC,KD,RW, LP	Date 12/14/2020	Time of Day Morning
School or Organization Name Jacobs	Group Members NA	
Stream Study Site Name (used for stream study permit, example: ERMS19 Rocky Gap HS Science Team) CATO-250011		
Name of Stream UNT to Big Hunting Creek	River or Body of Water (into which stream flows) UNT to Big Hunting Creek	
Latitude _____ 39.639667° _____ degrees NORTH	Longitude _____ -77.449944 _____ degrees WEST	
Weather		
Today's Air Temperature: _____ 32F ° C or ° F	Today's Humidity: _____ 97 %	
Today's Cloud Cover: _____ Clear _____ Partly Cloudy _____ X Cloudy	Yesterday's Precipitation: https://water.weather.gov/precip/ _____ 0 _____ Inches	
How could yesterday's weather affect today's field investigation? No effect.		
PREDICTION: Do you think this stream is healthy or unhealthy? Support your prediction and explain why you think so. Healthy		

Stream Health Assessment: Instructions

Next, use the three stream assessments in this data sheet to guide your investigations. At the end of each section, you will use your tests and observations to give your stream a rating for that individual assessment. Then, at the end, use the results from all three assessments to determine an overall stream health rating. How does this rating compare with the prediction you made above?

Physical Assessment: Stream Corridor Assessment

Based on Stream Corridor Assessment protocols developed by Kenneth Yetman, adapted by Amanda Sullivan and Alison Armocida, MD Department of Natural Resources.

Instructions: Observe the stream habitat in and around the water and use the accompanying Stream Corridor Assessment [photographs](#) to rank each characteristic. Based on your findings, you will give your stream habitat a rating.

CHARACTERISTIC	Good (4)	Fair (3)	Marginal (2)	Poor (1)	Score
Floodplain Vegetation	Lots of plants, bushes, and trees along banks and floodplain.	Some plants, bushes, and trees along banks and floodplain.	Most trees and bushes are gone.	Very little plant life at all along banks and floodplain.	4
Channel Alteration	Channel formed by natural processes and allowed to bend often around rocks and wood.	Channel straightened in some places but some natural bends are still present.	Channel mostly straightened but vegetation still present and no cement.	Channel straightened and flowing along a paved channel.	4
Embeddedness – Are there rocks on the bottom covered in silt?	Rocks and cobbles cover almost all of the stream bed. Very little sand or silt between rocks.	Rocks and cobbles cover most of the stream bed. Some sand/silt between and on rocks.	Rocks and cobbles more than halfway buried (embedded) into sand/silt.	Rocks and cobbles entirely buried by sand and silt.	4
Erosion	Banks only slightly above the surface of the water.	Banks somewhat higher above the surface of the water.	Banks significantly above the surface of the water.	Banks extremely high compared to water surface.	4
Attachment Sites for Macroinvertebrates	Lots of different sized rocks, wood, and plenty of leaf litter.	Only small, gravel sized rocks, some wood and leaf litter present.	No rocks or wood but some leaf litter present.	No rocks, no wood, no leaf litter present.	1
Shelter for Fish	Lots of pools, woody debris, and undercut banks present in the water.	Some pools, wood, and undercut banks present.	Few pools, wood, and undercut banks present.	No pools, no wood, no undercut banks present in the water.	1
Riparian Buffer Width (Estimate or Measure)	More than 50ft of trees and brushy vegetation extending out from EACH bank of the stream.	20-50ft of trees and brushy vegetation extending out from EACH bank of the stream.	5-20ft of trees and brushy vegetation extending out from EACH bank of the stream.	0-5ft of trees and brushy vegetation extending out from EACH bank of the stream.	4

CHARATERISTIC	Good (4)	Fair (3)	Marginal (2)	Poor (1)	Score
Bank Stability – Are the banks of the stream eroding or could they easily erode?	Lots of roots and vegetation or large rocks on the vertical portion of the bank all the way down to the surface of the water.	Roots and vegetation or large rocks/boulders covering the vertical part of the bank 2/3 of the way down to the surface of the water.	Roots, vegetation and/or large rocks/boulders going only 1/3 of the way down vertical part of bank to surface of the water.	Steep banks of bare soil with no plants or roots or large rocks.	3
Velocity and Depth – Within 30ft upstream and 30ft downstream from where you are standing There are no pictures for this category.	Stream has areas of (1) fast/deep water, (2) fast/shallow water, (3) slow/shallow areas, or (4) slow/deep areas.	Stream has 3 of the 4 types of speed and depth combinations.	Stream has 2 of the 4 types of speed and depth combinations.	Stream has only 1 type of velocity and depth combination.	1

Add all scores to get a total. Total Score for Stream 26

ANALYSIS:

If the total score is:

Then the overall stream rating is:

30 - 36

GOOD

This stream has excellent habitat with a wide variety of traits. If the water quality is good this stream can support many different species of insects and fish, including those sensitive to pollution and habitat changes. The stream is stable; habitat quality will not get worse unless humans make changes to the area.

23 – 29

FAIR

This stream has good habitat for many different species of insects and fish, including some sensitive to pollution and habitat changes. The stream is most likely stable. Minor changes can increase the habitat quality, such as stabilizing erosion or planting vegetation.

16 – 22

MARGINAL

This stream can support some species of insects and fish that are tolerant to pollution. The stream is not stable and will get worse without human restoration. Habitat can be improved by planting vegetation near the stream, stabilizing erosion, or reducing water from impervious surfaces.

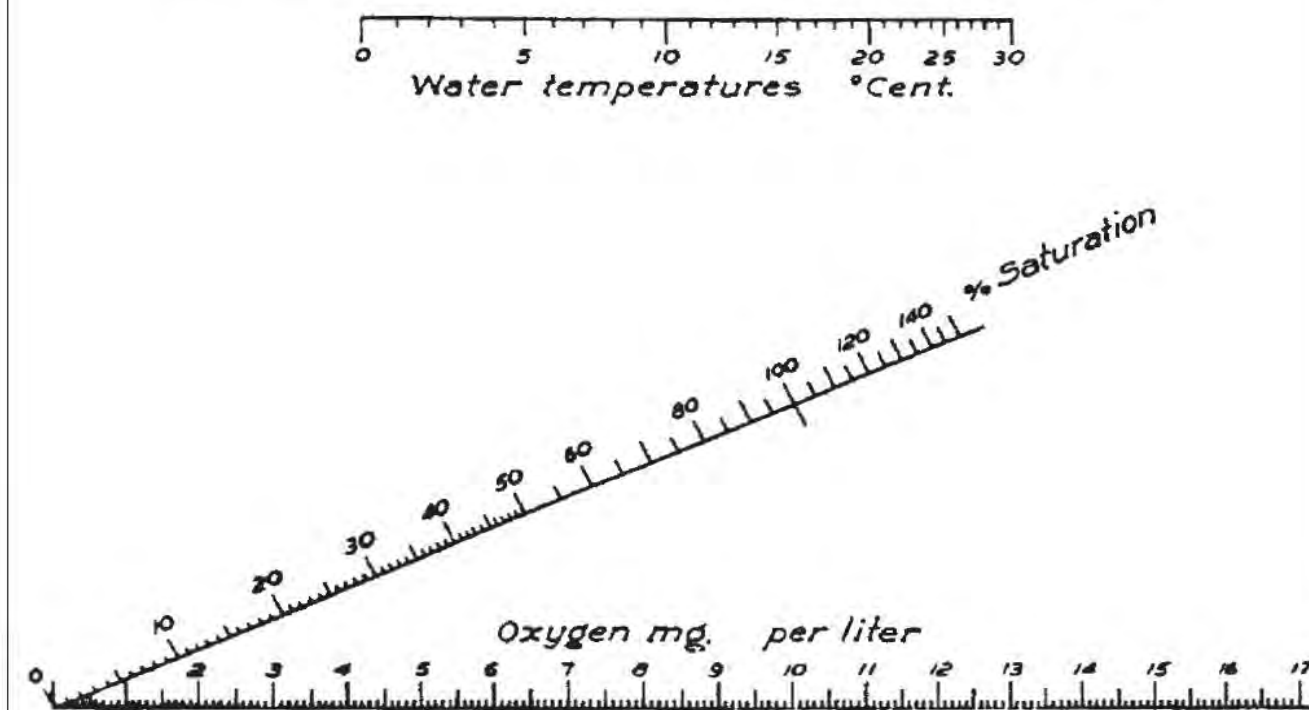
9 – 15

POOR

This stream may only support a few species of insects that are highly tolerant to pollution. The stream is not stable and will get worse without human restoration. Habitat can be improved by planting vegetation near the stream, stabilizing erosion, or reducing water from paved areas.

Stream Corridor Habitat Rating: Fair

FINDING THE PERCENT SATURATION OF DISSOLVED OXYGEN



To read this chart, use a straight edge. Place the straight edge on the mg/L of oxygen you have determined for your site, then place the other end of the straight edge on the water temperature you have measured. The point where the straight line passes through the line labeled “% Saturation” is your percent saturation.

Diagram reprinted with permission from M.K. Mitchell and W. B. Stapp, *Field Manual for Water Quality Monitoring*

Overall Stream Health Assessment

Record your ratings from all three of the tests above (Physical, Biological, and Chemical) here:

Based on your tests and observations, how would you rate the health of your stream overall?

Assessment	Good	Fair	Marginal	Poor
Stream Corridor Assessment – Physical		X		
Macroinvertebrate Survey – Biological				
Water Quality Tests - Chemical				

Comments:

OVERALL STREAM HEALTH Fair

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“Explore and Restore Maryland Streams” – Maryland Department of Natural Resources - 2019

Stream Health Data Sheet

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Stream Site and Stream Investigator's Information

Name (Teacher / Observer) BC,KD,RW, LP	Date 12/14/2020	Time of Day Morning
School or Organization Name Jacobs	Group Members NA	
Stream Study Site Name (used for stream study permit, example: ERMS19 Rocky Gap HS Science Team) CATO-250011		
Name of Stream UNT to Big Hunting Creek	River or Body of Water (into which stream flows) UNT to Big Hunting Creek	
Latitude _____ 39.639099° _____ degrees NORTH	Longitude _____ -77.450375 _____ degrees WEST	
Weather		
Today's Air Temperature: _____ 32F ° C or ° F	Today's Humidity: _____ 97 %	
Today's Cloud Cover: _____ Clear _____ Partly Cloudy _____ X Cloudy	Yesterday's Precipitation: https://water.weather.gov/precip/ _____ 0 _____ Inches	
How could yesterday's weather affect today's field investigation? No effect.		
PREDICTION: Do you think this stream is healthy or unhealthy? Support your prediction and explain why you think so. Healthy		

Stream Health Assessment: Instructions

Next, use the three stream assessments in this data sheet to guide your investigations. At the end of each section, you will use your tests and observations to give your stream a rating for that individual assessment. Then, at the end, use the results from all three assessments to determine an overall stream health rating. How does this rating compare with the prediction you made above?

Physical Assessment: Stream Corridor Assessment

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Instructions: Observe the stream habitat in and around the water and use the accompanying Stream Corridor Assessment [photographs](#) to rank each characteristic. Based on your findings, you will give your stream habitat a rating.

CHARACTERISTIC	Good (4)	Fair (3)	Marginal (2)	Poor (1)	Score
Floodplain Vegetation	Lots of plants, bushes, and trees along banks and floodplain.	Some plants, bushes, and trees along banks and floodplain.	Most trees and bushes are gone.	Very little plant life at all along banks and floodplain.	4
Channel Alteration	Channel formed by natural processes and allowed to bend often around rocks and wood.	Channel straightened in some places but some natural bends are still present.	Channel mostly straightened but vegetation still present and no cement.	Channel straightened and flowing along a paved channel.	4
Embeddedness – Are there rocks on the bottom covered in silt?	Rocks and cobbles cover almost all of the stream bed. Very little sand or silt between rocks.	Rocks and cobbles cover most of the stream bed. Some sand/silt between and on rocks.	Rocks and cobbles more than halfway buried (embedded) into sand/silt.	Rocks and cobbles entirely buried by sand and silt.	4
Erosion	Banks only slightly above the surface of the water.	Banks somewhat higher above the surface of the water.	Banks significantly above the surface of the water.	Banks extremely high compared to water surface.	4
Attachment Sites for Macroinvertebrates	Lots of different sized rocks, wood, and plenty of leaf litter.	Only small, gravel sized rocks, some wood and leaf litter present.	No rocks or wood but some leaf litter present.	No rocks, no wood, no leaf litter present.	1
Shelter for Fish	Lots of pools, woody debris, and undercut banks present in the water.	Some pools, wood, and undercut banks present.	Few pools, wood, and undercut banks present.	No pools, no wood, no undercut banks present in the water.	1
Riparian Buffer Width (Estimate or Measure)	More than 50ft of trees and brushy vegetation extending out from EACH bank of the stream.	20-50ft of trees and brushy vegetation extending out from EACH bank of the stream.	5-20ft of trees and brushy vegetation extending out from EACH bank of the stream.	0-5ft of trees and brushy vegetation extending out from EACH bank of the stream.	4

CHARATERISTIC	Good (4)	Fair (3)	Marginal (2)	Poor (1)	Score
Bank Stability – Are the banks of the stream eroding or could they easily erode?	Lots of roots and vegetation or large rocks on the vertical portion of the bank all the way down to the surface of the water.	Roots and vegetation or large rocks/boulders covering the vertical part of the bank 2/3 of the way down to the surface of the water.	Roots, vegetation and/or large rocks/boulders going only 1/3 of the way down vertical part of bank to surface of the water.	Steep banks of bare soil with no plants or roots or large rocks.	3
Velocity and Depth – Within 30ft upstream and 30ft downstream from where you are standing There are no pictures for this category.	Stream has areas of (1) fast/deep water, (2) fast/shallow water, (3) slow/shallow areas, or (4) slow/deep areas.	Stream has 3 of the 4 types of speed and depth combinations.	Stream has 2 of the 4 types of speed and depth combinations.	Stream has only 1 type of velocity and depth combination.	1

Add all scores to get a total. Total Score for Stream 26

ANALYSIS:

If the total score is:

Then the overall stream rating is:

30 - 36

GOOD

This stream has excellent habitat with a wide variety of traits. If the water quality is good this stream can support many different species of insects and fish, including those sensitive to pollution and habitat changes. The stream is stable; habitat quality will not get worse unless humans make changes to the area.

23 – 29

FAIR

This stream has good habitat for many different species of insects and fish, including some sensitive to pollution and habitat changes. The stream is most likely stable. Minor changes can increase the habitat quality, such as stabilizing erosion or planting vegetation.

16 – 22

MARGINAL

This stream can support some species of insects and fish that are tolerant to pollution. The stream is not stable and will get worse without human restoration. Habitat can be improved by planting vegetation near the stream, stabilizing erosion, or reducing water from impervious surfaces.

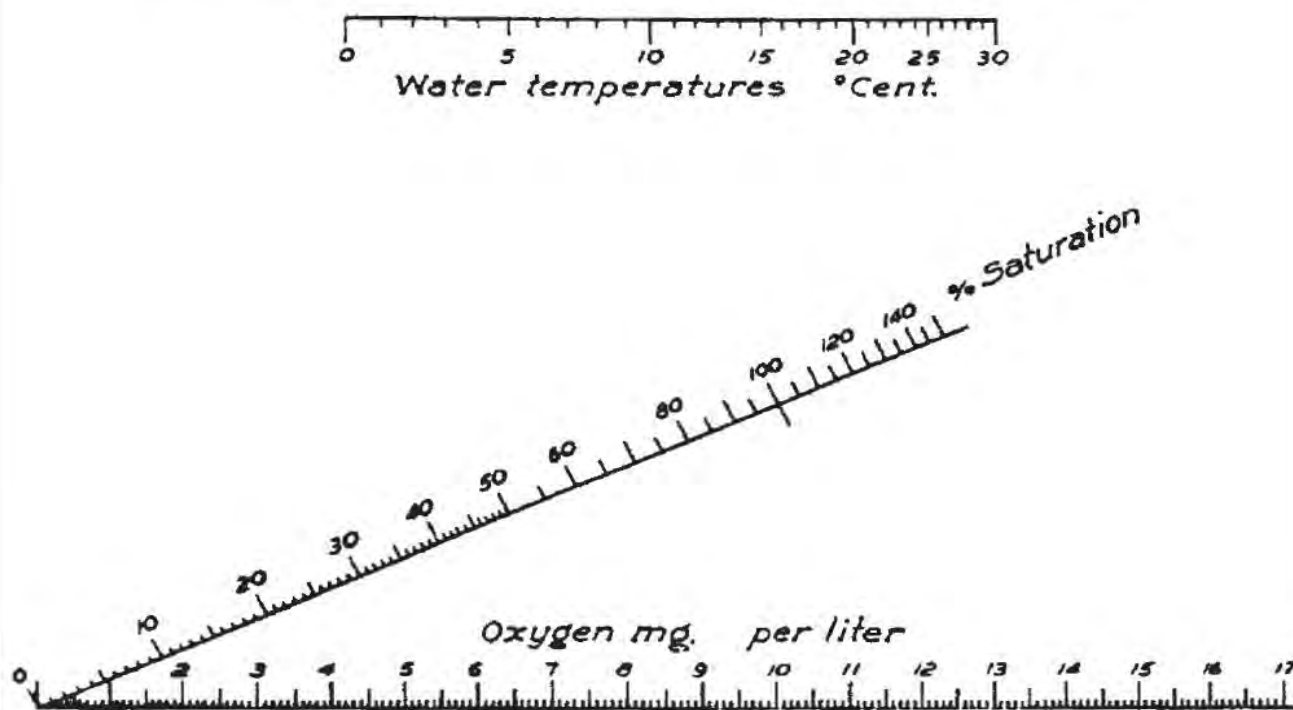
9 – 15

POOR

This stream may only support a few species of insects that are highly tolerant to pollution. The stream is not stable and will get worse without human restoration. Habitat can be improved by planting vegetation near the stream, stabilizing erosion, or reducing water from paved areas.

Stream Corridor Habitat Rating: Fair

FINDING THE PERCENT SATURATION OF DISSOLVED OXYGEN



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Overall Stream Health Assessment

Record your ratings from all three of the tests above (Physical, Biological, and Chemical) here:

Based on your tests and observations, how would you rate the health of your stream overall?

Assessment	Good	Fair	Marginal	Poor
Stream Corridor Assessment – Physical		X		
Macroinvertebrate Survey – Biological				
Water Quality Tests - Chemical				

Comments:

OVERALL STREAM HEALTH Fair

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Latitude 39.635508° degrees NORTH	Longitude -77.450705 degrees WEST	
Weather		
Today's Air Temperature: 32F ° C or ° F	Today's Humidity: 97 %	
Today's Cloud Cover: Clear Partly Cloudy X Cloudy	Yesterday's Precipitation: https://water.weather.gov/precip/ 0 Inches	
How could yesterday's weather affect today's field investigation? No effect.		
PREDICTION: Do you think this stream is healthy or unhealthy? Support your prediction and explain why you think so. Healthy, wide riparian buffer and many sites for macroinvertebrate attachments.		

Stream Health Assessment: Instructions

Next, use the three stream assessments in this data sheet to guide your investigations. At the end of each section, you will use your tests and observations to give your stream a rating for that individual assessment. Then, at the end, use the results from all three assessments to determine an overall stream health rating. How does this rating compare with the prediction you made above?

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Channel Alteration	Channel formed by natural processes and allowed to bend often around rocks and wood.	Channel straightened in some places but some natural bends are still present.	Channel mostly straightened but vegetation still present and no cement.	Channel straightened and flowing along a paved channel.	4
Embeddedness – Are there rocks on the bottom covered in silt?	Rocks and cobbles cover almost all of the stream bed. Very little sand or silt between rocks.	Rocks and cobbles cover most of the stream bed. Some sand/silt between and on rocks.	Rocks and cobbles more than halfway buried (embedded) into sand/silt.	Rocks and cobbles entirely buried by sand and silt.	2
Erosion	Banks only slightly above the surface of the water.	Banks somewhat higher above the surface of the water.	Banks significantly above the surface of the water.	Banks extremely high compared to water surface.	3
Attachment Sites for Macroinvertebrates	Lots of different sized rocks, wood, and plenty of leaf litter.	Only small, gravel sized rocks, some wood and leaf litter present.	No rocks or wood but some leaf litter present.	No rocks, no wood, no leaf litter present.	3
Shelter for Fish	Lots of pools, woody debris, and undercut banks present in the water.	Some pools, wood, and undercut banks present.	Few pools, wood, and undercut banks present.	No pools, no wood, no undercut banks present in the water.	2
Riparian Buffer Width (Estimate or Measure)	More than 50ft of trees and brushy vegetation extending out from EACH bank of the stream.	20-50ft of trees and brushy vegetation extending out from EACH bank of the stream.	5-20ft of trees and brushy vegetation extending out from EACH bank of the stream.	0-5ft of trees and brushy vegetation extending out from EACH bank of the stream.	4

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Velocity and Depth – Within 30ft upstream and 30ft downstream from where you are standing There are no pictures for this category.	Stream has areas of (1) fast/deep water, (2) fast/shallow water, (3) slow/shallow areas, or (4) slow/deep areas.	Stream has 3 of the 4 types of speed and depth combinations.	Stream has 2 of the 4 types of speed and depth combinations.	Stream has only 1 type of velocity and depth combination.	3

Add all scores to get a total. Total Score for Stream 28

ANALYSIS:

If the total score is:

Then the overall stream rating is:

30 - 36

GOOD

This stream has excellent habitat with a wide variety of traits. If the water quality is good this stream can support many different species of insects and fish, including those sensitive to pollution and habitat changes. The stream is stable; habitat quality will not get worse unless humans make changes to the area.

23 – 29

FAIR

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16 – 22

MARGINAL

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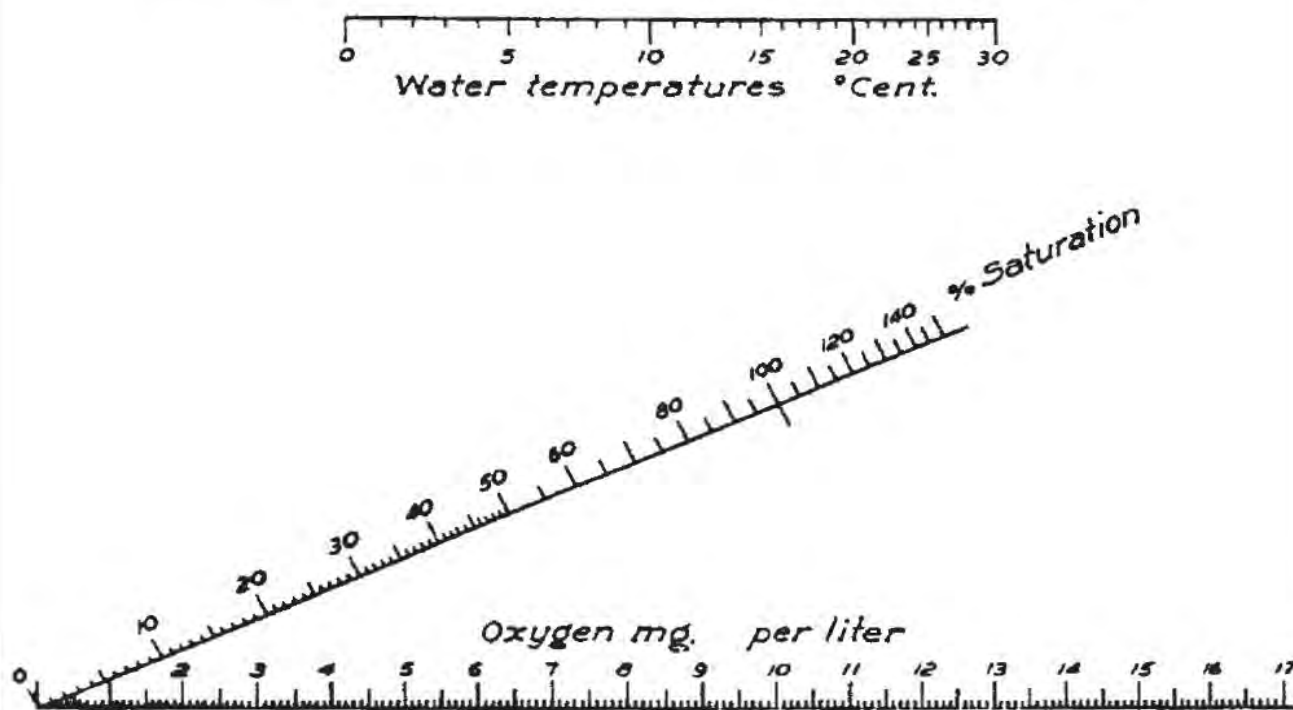
9 – 15

POOR

This stream may only support a few species of insects that are highly tolerant to pollution. The stream is not stable and will get worse without human restoration. Habitat can be improved by planting vegetation near the stream, stabilizing erosion, or reducing water from paved areas.

Stream Corridor Habitat Rating: Fair

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Today's Cloud Cover: Clear Partly Cloudy X Cloudy	Yesterday's Precipitation: https://water.weather.gov/precip/ 0 Inches	
How could yesterday's weather affect today's field investigation? No effect.		
PREDICTION: Do you think this stream is healthy or unhealthy? Support your prediction and explain why you think so. Healthy, wide riparian buffer and a few sites for macroinvertebrate attachments.		

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Erosion	Banks only slightly above the surface of the water.	Banks somewhat higher above the surface of the water.	Banks significantly above the surface of the water.	Banks extremely high compared to water surface.	3
Attachment Sites for Macroinvertebrates	Lots of different sized rocks, wood, and plenty of leaf litter.	Only small, gravel sized rocks, some wood and leaf litter present.	No rocks or wood but some leaf litter present.	No rocks, no wood, no leaf litter present.	3
Shelter for Fish	Lots of pools, woody debris, and undercut banks present in the water.	Some pools, wood, and undercut banks present.	Few pools, wood, and undercut banks present.	No pools, no wood, no undercut banks present in the water.	3
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Velocity and Depth – Within 30ft upstream and 30ft downstream from where you are standing There are no pictures for this category.	Stream has areas of (1) fast/deep water, (2) fast/shallow water, (3) slow/shallow areas, or (4) slow/deep areas.	Stream has 3 of the 4 types of speed and depth combinations.	Stream has 2 of the 4 types of speed and depth combinations.	Stream has only 1 type of velocity and depth combination.	3

Add all scores to get a total. Total Score for Stream 28

ANALYSIS:

If the total score is:

Then the overall stream rating is:

30 - 36

GOOD

This stream has excellent habitat with a wide variety of traits. If the water quality is good this stream can support many different species of insects and fish, including those sensitive to pollution and habitat changes. The stream is stable; habitat quality will not get worse unless humans make changes to the area.

23 – 29

FAIR

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16 – 22

MARGINAL

This stream can support some species of insects and fish that are tolerant to pollution. The stream is not stable and will get worse without human restoration. Habitat can be improved by planting vegetation near the stream, stabilizing erosion, or reducing water from impervious surfaces.

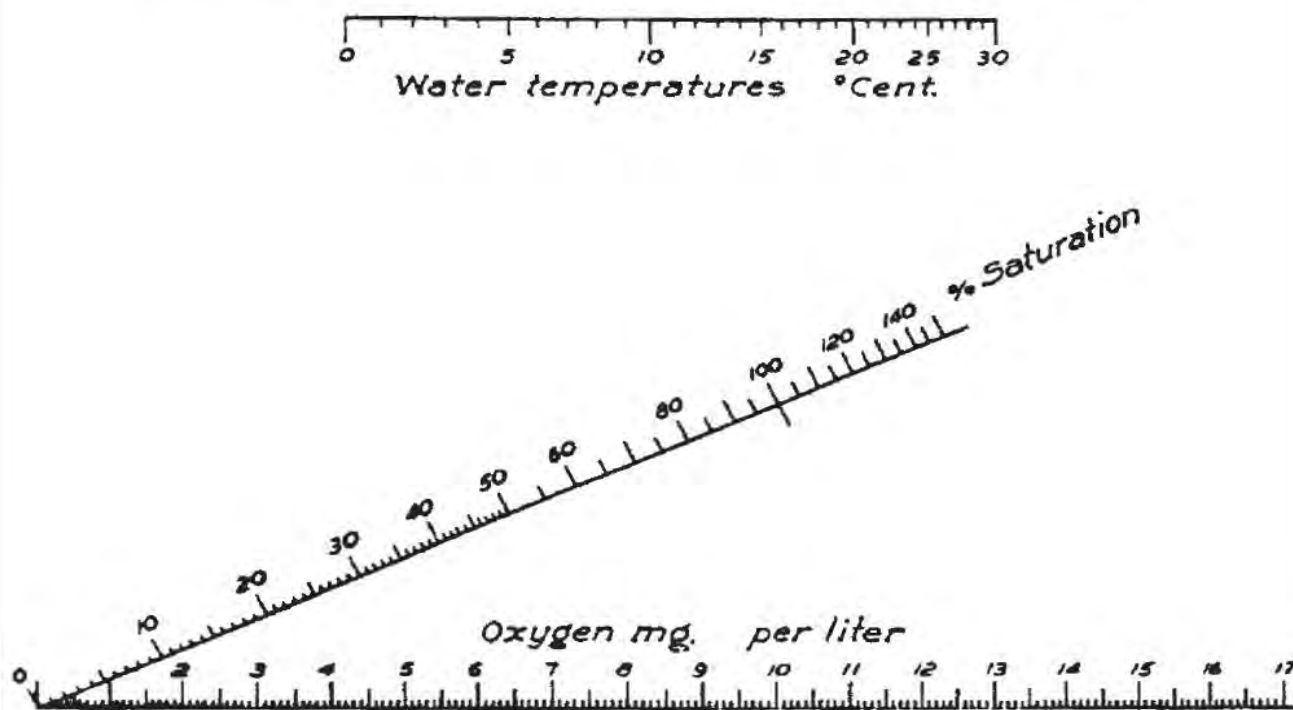
9 – 15

POOR

This stream may only support a few species of insects that are highly tolerant to pollution. The stream is not stable and will get worse without human restoration. Habitat can be improved by planting vegetation near the stream, stabilizing erosion, or reducing water from paved areas.

Stream Corridor Habitat Rating: Fair

FINDING THE PERCENT SATURATION OF DISSOLVED OXYGEN



To read this chart, use a straight edge. Place the straight edge on the mg/L of oxygen you have determined for your site, then place the other end of the straight edge on the water temperature you have measured. The point where the straight line passes through the line labeled “% Saturation” is your percent saturation.

Diagram reprinted with permission from M.K. Mitchell and W. B. Stapp, *Field Manual for Water Quality Monitoring*

Overall Stream Health Assessment

Record your ratings from all three of the tests above (Physical, Biological, and Chemical) here:

Based on your tests and observations, how would you rate the health of your stream overall?

Assessment	Good	Fair	Marginal	Poor
Stream Corridor Assessment – Physical		X		
Macroinvertebrate Survey – Biological				
Water Quality Tests - Chemical				

Comments:

OVERALL STREAM HEALTH Fair

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“Explore and Restore Maryland Streams” – Maryland Department of Natural Resources - 2019

Stream Health Data Sheet

Record information on this sheet as you conduct assessments to determine overall health of your stream. There are three stream assessments for this investigation: (1) **physical**, rating the condition of the stream habitat based on observable characteristics; (2) **biological**, using living animals present to indicate stream health; and (3) **chemical**, testing the water quality based on the chemical content of the stream. Use all three to get a more thorough rating of your stream's health. You may share your findings and compare data with others on the [Maryland Student Stream Health](#) map.

Stream Site and Stream Investigator's Information

Name (Teacher / Observer) BC,KD,RW, LP	Date 12/14/2020	Time of Day Morning
School or Organization Name Jacobs	Group Members NA	
Stream Study Site Name (used for stream study permit, example: ERMS19 Rocky Gap HS Science Team) CATO-250011		
Name of Stream S-KD-005 Owens Creek	River or Body of Water (into which stream flows) Owens Creek	
Latitude 39.658720° degrees NORTH	Longitude -77.484123 degrees WEST	
Weather		
Today's Air Temperature: 32F ° C or ° F	Today's Humidity: 97 %	
Today's Cloud Cover: Clear Partly Cloudy X Cloudy	Yesterday's Precipitation: https://water.weather.gov/precip/ 0 Inches	
How could yesterday's weather affect today's field investigation? No effect.		
PREDICTION: Do you think this stream is healthy or unhealthy? Support your prediction and explain why you think so. Healthy, wide riparian buffer, located in proximity to special status wetlands and protected species.		

Stream Health Assessment: Instructions

Next, use the three stream assessments in this data sheet to guide your investigations. At the end of each section, you will use your tests and observations to give your stream a rating for that individual assessment. Then, at the end, use the results from all three assessments to determine an overall stream health rating. How does this rating compare with the prediction you made above?

Physical Assessment: Stream Corridor Assessment

Based on Stream Corridor Assessment protocols developed by Kenneth Yetman, adapted by Amanda Sullivan and Alison Armocida, MD Department of Natural Resources.

Instructions: Observe the stream habitat in and around the water and use the accompanying Stream Corridor Assessment [photographs](#) to rank each characteristic. Based on your findings, you will give your stream habitat a rating.

CHARACTERISTIC	Good (4)	Fair (3)	Marginal (2)	Poor (1)	Score
Floodplain Vegetation	Lots of plants, bushes, and trees along banks and floodplain.	Some plants, bushes, and trees along banks and floodplain.	Most trees and bushes are gone.	Very little plant life at all along banks and floodplain.	4
Channel Alteration	Channel formed by natural processes and allowed to bend often around rocks and wood.	Channel straightened in some places but some natural bends are still present.	Channel mostly straightened but vegetation still present and no cement.	Channel straightened and flowing along a paved channel.	3
Embeddedness – Are there rocks on the bottom covered in silt?	Rocks and cobbles cover almost all of the stream bed. Very little sand or silt between rocks.	Rocks and cobbles cover most of the stream bed. Some sand/silt between and on rocks.	Rocks and cobbles more than halfway buried (embedded) into sand/silt.	Rocks and cobbles entirely buried by sand and silt.	4
Erosion	Banks only slightly above the surface of the water.	Banks somewhat higher above the surface of the water.	Banks significantly above the surface of the water.	Banks extremely high compared to water surface.	3
Attachment Sites for Macroinvertebrates	Lots of different sized rocks, wood, and plenty of leaf litter.	Only small, gravel sized rocks, some wood and leaf litter present.	No rocks or wood but some leaf litter present.	No rocks, no wood, no leaf litter present.	4
Shelter for Fish	Lots of pools, woody debris, and undercut banks present in the water.	Some pools, wood, and undercut banks present.	Few pools, wood, and undercut banks present.	No pools, no wood, no undercut banks present in the water.	3
Riparian Buffer Width (Estimate or Measure)	More than 50ft of trees and brushy vegetation extending out from EACH bank of the stream.	20-50ft of trees and brushy vegetation extending out from EACH bank of the stream.	5-20ft of trees and brushy vegetation extending out from EACH bank of the stream.	0-5ft of trees and brushy vegetation extending out from EACH bank of the stream.	4

CHARATERISTIC	Good (4)	Fair (3)	Marginal (2)	Poor (1)	Score
Bank Stability – Are the banks of the stream eroding or could they easily erode?	Lots of roots and vegetation or large rocks on the vertical portion of the bank all the way down to the surface of the water.	Roots and vegetation or large rocks/boulders covering the vertical part of the bank 2/3 of the way down to the surface of the water.	Roots, vegetation and/or large rocks/boulders going only 1/3 of the way down vertical part of bank to surface of the water.	Steep banks of bare soil with no plants or roots or large rocks.	4
Velocity and Depth – Within 30ft upstream and 30ft downstream from where you are standing There are no pictures for this category.	Stream has areas of (1) fast/deep water, (2) fast/shallow water, (3) slow/shallow areas, or (4) slow/deep areas.	Stream has 3 of the 4 types of speed and depth combinations.	Stream has 2 of the 4 types of speed and depth combinations.	Stream has only 1 type of velocity and depth combination.	3

Add all scores to get a total. Total Score for Stream 32

ANALYSIS:

If the total score is:

Then the overall stream rating is:

30 - 36

GOOD

This stream has excellent habitat with a wide variety of traits. If the water quality is good this stream can support many different species of insects and fish, including those sensitive to pollution and habitat changes. The stream is stable; habitat quality will not get worse unless humans make changes to the area.

23 – 29

FAIR

This stream has good habitat for many different species of insects and fish, including some sensitive to pollution and habitat changes. The stream is most likely stable. Minor changes can increase the habitat quality, such as stabilizing erosion or planting vegetation.

16 – 22

MARGINAL

This stream can support some species of insects and fish that are tolerant to pollution. The stream is not stable and will get worse without human restoration. Habitat can be improved by planting vegetation near the stream, stabilizing erosion, or reducing water from impervious surfaces.

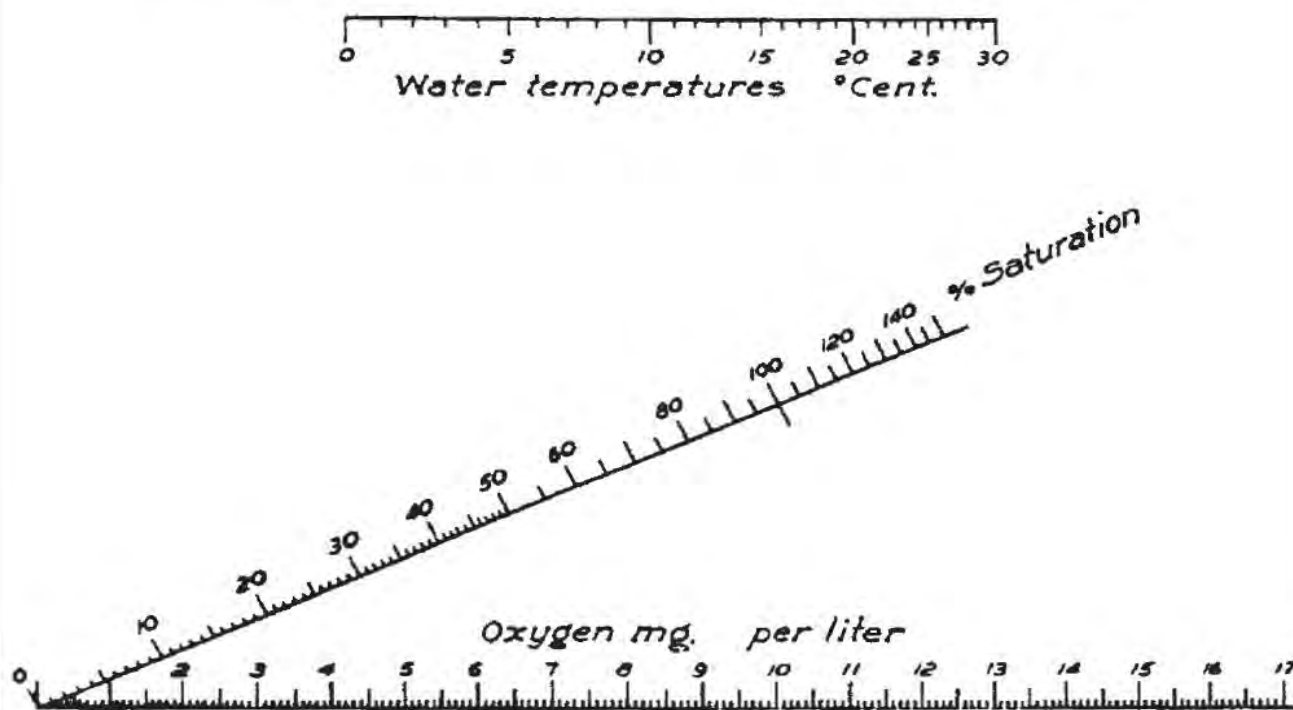
9 – 15

POOR

This stream may only support a few species of insects that are highly tolerant to pollution. The stream is not stable and will get worse without human restoration. Habitat can be improved by planting vegetation near the stream, stabilizing erosion, or reducing water from paved areas.

Stream Corridor Habitat Rating: Good

FINDING THE PERCENT SATURATION OF DISSOLVED OXYGEN



To read this chart, use a straight edge. Place the straight edge on the mg/L of oxygen you have determined for your site, then place the other end of the straight edge on the water temperature you have measured. The point where the straight line passes through the line labeled “% Saturation” is your percent saturation.

Diagram reprinted with permission from M.K. Mitchell and W. B. Stapp, *Field Manual for Water Quality Monitoring*

Overall Stream Health Assessment

Record your ratings from all three of the tests above (Physical, Biological, and Chemical) here:

Based on your tests and observations, how would you rate the health of your stream overall?

Assessment	Good	Fair	Marginal	Poor
Stream Corridor Assessment – Physical	X			
Macroinvertebrate Survey – Biological				
Water Quality Tests - Chemical				

Comments:

OVERALL STREAM HEALTH Good

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“Explore and Restore Maryland Streams” – Maryland Department of Natural Resources - 2019

Stream Health Data Sheet

Record information on this sheet as you conduct assessments to determine overall health of your stream. There are three stream assessments for this investigation: (1) **physical**, rating the condition of the stream habitat based on observable characteristics; (2) **biological**, using living animals present to indicate stream health; and (3) **chemical**, testing the water quality based on the chemical content of the stream. Use all three to get a more thorough rating of your stream's health. You may share your findings and compare data with others on the [Maryland Student Stream Health](#) map.

Stream Site and Stream Investigator's Information

Name (Teacher / Observer) BC,KD,RW, LP	Date 12/14/2020	Time of Day Afternoon
School or Organization Name Jacobs	Group Members NA	
Stream Study Site Name (used for stream study permit, example: ERMS19 Rocky Gap HS Science Team) CATO-250011		
Name of Stream S-KD-006 Tributary to Owens Creek	River or Body of Water (into which stream flows) Owens Creek	
Latitude 39.658612° degrees NORTH	Longitude -77.483837 degrees WEST	
Weather		
Today's Air Temperature: 32F ° C or ° F	Today's Humidity: 97 %	
Today's Cloud Cover: Clear Partly Cloudy X Cloudy	Yesterday's Precipitation: https://water.weather.gov/precip/ 0 Inches	
How could yesterday's weather affect today's field investigation? No effect.		
PREDICTION: Do you think this stream is healthy or unhealthy? Support your prediction and explain why you think so. Healthy, wide riparian buffer, located in proximity to special status wetlands and protected species. However, signs of erosion		

Stream Health Assessment: Instructions

Next, use the three stream assessments in this data sheet to guide your investigations. At the end of each section, you will use your tests and observations to give your stream a rating for that individual assessment. Then, at the end, use the results from all three assessments to determine an overall stream health rating. How does this rating compare with the prediction you made above?

Physical Assessment: Stream Corridor Assessment

Based on Stream Corridor Assessment protocols developed by Kenneth Yetman, adapted by Amanda Sullivan and Alison Armocida, MD Department of Natural Resources.

Instructions: Observe the stream habitat in and around the water and use the accompanying Stream Corridor Assessment [photographs](#) to rank each characteristic. Based on your findings, you will give your stream habitat a rating.

CHARACTERISTIC	Good (4)	Fair (3)	Marginal (2)	Poor (1)	Score
Floodplain Vegetation	Lots of plants, bushes, and trees along banks and floodplain.	Some plants, bushes, and trees along banks and floodplain.	Most trees and bushes are gone.	Very little plant life at all along banks and floodplain.	4
Channel Alteration	Channel formed by natural processes and allowed to bend often around rocks and wood.	Channel straightened in some places but some natural bends are still present.	Channel mostly straightened but vegetation still present and no cement.	Channel straightened and flowing along a paved channel.	4
Embeddedness – Are there rocks on the bottom covered in silt?	Rocks and cobbles cover almost all of the stream bed. Very little sand or silt between rocks.	Rocks and cobbles cover most of the stream bed. Some sand/silt between and on rocks.	Rocks and cobbles more than halfway buried (embedded) into sand/silt.	Rocks and cobbles entirely buried by sand and silt.	3
Erosion	Banks only slightly above the surface of the water.	Banks somewhat higher above the surface of the water.	Banks significantly above the surface of the water.	Banks extremely high compared to water surface.	3
Attachment Sites for Macroinvertebrates	Lots of different sized rocks, wood, and plenty of leaf litter.	Only small, gravel sized rocks, some wood and leaf litter present.	No rocks or wood but some leaf litter present.	No rocks, no wood, no leaf litter present.	3
Shelter for Fish	Lots of pools, woody debris, and undercut banks present in the water.	Some pools, wood, and undercut banks present.	Few pools, wood, and undercut banks present.	No pools, no wood, no undercut banks present in the water.	3
Riparian Buffer Width (Estimate or Measure)	More than 50ft of trees and brushy vegetation extending out from EACH bank of the stream.	20-50ft of trees and brushy vegetation extending out from EACH bank of the stream.	5-20ft of trees and brushy vegetation extending out from EACH bank of the stream.	0-5ft of trees and brushy vegetation extending out from EACH bank of the stream.	4

CHARATERISTIC	Good (4)	Fair (3)	Marginal (2)	Poor (1)	Score
Bank Stability – Are the banks of the stream eroding or could they easily erode?	Lots of roots and vegetation or large rocks on the vertical portion of the bank all the way down to the surface of the water.	Roots and vegetation or large rocks/boulders covering the vertical part of the bank 2/3 of the way down to the surface of the water.	Roots, vegetation and/or large rocks/boulders going only 1/3 of the way down vertical part of bank to surface of the water.	Steep banks of bare soil with no plants or roots or large rocks.	3
Velocity and Depth – Within 30ft upstream and 30ft downstream from where you are standing There are no pictures for this category.	Stream has areas of (1) fast/deep water, (2) fast/shallow water, (3) slow/shallow areas, or (4) slow/deep areas.	Stream has 3 of the 4 types of speed and depth combinations.	Stream has 2 of the 4 types of speed and depth combinations.	Stream has only 1 type of velocity and depth combination.	3
Add all scores to get a total. Total Score for Stream <u>30</u>					

ANALYSIS:

If the total score is:

Then the overall stream rating is:

30 - 36

GOOD

This stream has excellent habitat with a wide variety of traits. If the water quality is good this stream can support many different species of insects and fish, including those sensitive to pollution and habitat changes. The stream is stable; habitat quality will not get worse unless humans make changes to the area.

23 – 29

FAIR

This stream has good habitat for many different species of insects and fish, including some sensitive to pollution and habitat changes. The stream is most likely stable. Minor changes can increase the habitat quality, such as stabilizing erosion or planting vegetation.

16 – 22

MARGINAL

This stream can support some species of insects and fish that are tolerant to pollution. The stream is not stable and will get worse without human restoration. Habitat can be improved by planting vegetation near the stream, stabilizing erosion, or reducing water from impervious surfaces.

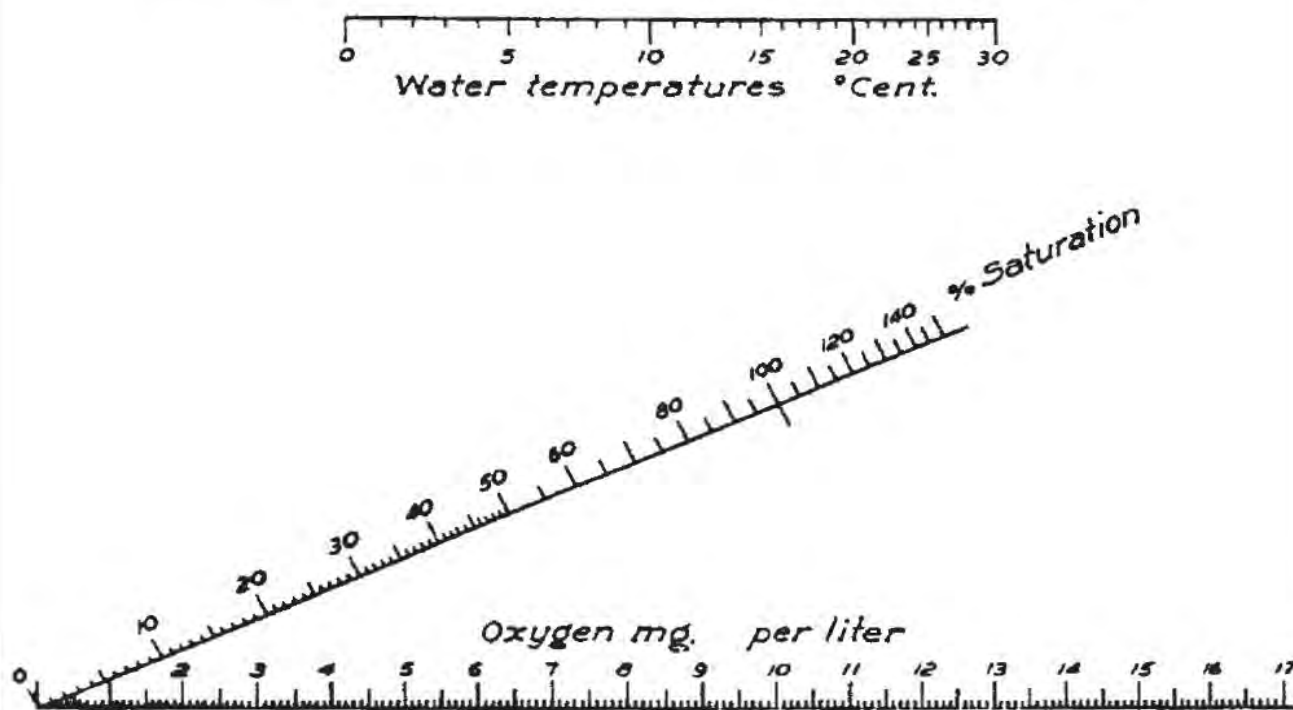
9 – 15

POOR

This stream may only support a few species of insects that are highly tolerant to pollution. The stream is not stable and will get worse without human restoration. Habitat can be improved by planting vegetation near the stream, stabilizing erosion, or reducing water from paved areas.

Stream Corridor Habitat Rating: Good

FINDING THE PERCENT SATURATION OF DISSOLVED OXYGEN



To read this chart, use a straight edge. Place the straight edge on the mg/L of oxygen you have determined for your site, then place the other end of the straight edge on the water temperature you have measured. The point where the straight line passes through the line labeled “% Saturation” is your percent saturation.

Diagram reprinted with permission from M.K. Mitchell and W. B. Stapp, *Field Manual for Water Quality Monitoring*

Overall Stream Health Assessment

Record your ratings from all three of the tests above (Physical, Biological, and Chemical) here:

Based on your tests and observations, how would you rate the health of your stream overall?

Assessment	Good	Fair	Marginal	Poor
Stream Corridor Assessment – Physical	X			
Macroinvertebrate Survey – Biological				
Water Quality Tests - Chemical				

Comments:

OVERALL STREAM HEALTH Good

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Stream Health Data Sheet

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Stream Site and Stream Investigator's Information

Name (Teacher / Observer) BC,KD,RW, LP	Date 12/15/2020	Time of Day Afternoon
School or Organization Name Jacobs	Group Members NA	
Stream Study Site Name (used for stream study permit, example: ERMS19 Rocky Gap HS Science Team) CATO-250011		
Name of Stream S-KD-007 Tributary to Owens Creek	River or Body of Water (into which stream flows) Owens Creek	
Latitude 39.645759° degrees NORTH	Longitude -77.483499 degrees WEST	
Weather		
Today's Air Temperature: 32F ° C or ° F	Today's Humidity: 97 %	
Today's Cloud Cover: Clear Partly Cloudy X Cloudy	Yesterday's Precipitation: https://water.weather.gov/precip/ 0.25 Inches	
How could yesterday's weather affect today's field investigation? No effect.		
PREDICTION: Do you think this stream is healthy or unhealthy? Support your prediction and explain why you think so. Poor, road side drainage culverted under Manahan Road.		

Stream Health Assessment: Instructions

Next, use the three stream assessments in this data sheet to guide your investigations. At the end of each section, you will use your tests and observations to give your stream a rating for that individual assessment. Then, at the end, use the results from all three assessments to determine an overall stream health rating. How does this rating compare with the prediction you made above?

Physical Assessment: Stream Corridor Assessment

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CHARACTERISTIC	Good (4)	Fair (3)	Marginal (2)	Poor (1)	Score
Floodplain Vegetation	Lots of plants, bushes, and trees along banks and floodplain.	Some plants, bushes, and trees along banks and floodplain.	Most trees and bushes are gone.	Very little plant life at all along banks and floodplain.	2
Channel Alteration	Channel formed by natural processes and allowed to bend often around rocks and wood.	Channel straightened in some places but some natural bends are still present.	Channel mostly straightened but vegetation still present and no cement.	Channel straightened and flowing along a paved channel.	2
Embeddedness – Are there rocks on the bottom covered in silt?	Rocks and cobbles cover almost all of the stream bed. Very little sand or silt between rocks.	Rocks and cobbles cover most of the stream bed. Some sand/silt between and on rocks.	Rocks and cobbles more than halfway buried (embedded) into sand/silt.	Rocks and cobbles entirely buried by sand and silt.	1
Erosion	Banks only slightly above the surface of the water.	Banks somewhat higher above the surface of the water.	Banks significantly above the surface of the water.	Banks extremely high compared to water surface.	3
Attachment Sites for Macroinvertebrates	Lots of different sized rocks, wood, and plenty of leaf litter.	Only small, gravel sized rocks, some wood and leaf litter present.	No rocks or wood but some leaf litter present.	No rocks, no wood, no leaf litter present.	2
Shelter for Fish	Lots of pools, woody debris, and undercut banks present in the water.	Some pools, wood, and undercut banks present.	Few pools, wood, and undercut banks present.	No pools, no wood, no undercut banks present in the water.	1
Riparian Buffer Width (Estimate or Measure)	More than 50ft of trees and brushy vegetation extending out from EACH bank of the stream.	20-50ft of trees and brushy vegetation extending out from EACH bank of the stream.	5-20ft of trees and brushy vegetation extending out from EACH bank of the stream.	0-5ft of trees and brushy vegetation extending out from EACH bank of the stream.	2

CHARATERISTIC	Good (4)	Fair (3)	Marginal (2)	Poor (1)	Score
Bank Stability – Are the banks of the stream eroding or could they easily erode?	Lots of roots and vegetation or large rocks on the vertical portion of the bank all the way down to the surface of the water.	Roots and vegetation or large rocks/boulders covering the vertical part of the bank 2/3 of the way down to the surface of the water.	Roots, vegetation and/or large rocks/boulders going only 1/3 of the way down vertical part of bank to surface of the water.	Steep banks of bare soil with no plants or roots or large rocks.	2
Velocity and Depth – Within 30ft upstream and 30ft downstream from where you are standing There are no pictures for this category.	Stream has areas of (1) fast/deep water, (2) fast/shallow water, (3) slow/shallow areas, or (4) slow/deep areas.	Stream has 3 of the 4 types of speed and depth combinations.	Stream has 2 of the 4 types of speed and depth combinations.	Stream has only 1 type of velocity and depth combination.	1

Add all scores to get a total. Total Score for Stream 16

ANALYSIS:

If the total score is:

Then the overall stream rating is:

30 - 36

GOOD

This stream has excellent habitat with a wide variety of traits. If the water quality is good this stream can support many different species of insects and fish, including those sensitive to pollution and habitat changes. The stream is stable; habitat quality will not get worse unless humans make changes to the area.

23 – 29

FAIR

This stream has good habitat for many different species of insects and fish, including some sensitive to pollution and habitat changes. The stream is most likely stable. Minor changes can increase the habitat quality, such as stabilizing erosion or planting vegetation.

16 – 22

MARGINAL

This stream can support some species of insects and fish that are tolerant to pollution. The stream is not stable and will get worse without human restoration. Habitat can be improved by planting vegetation near the stream, stabilizing erosion, or reducing water from impervious surfaces.

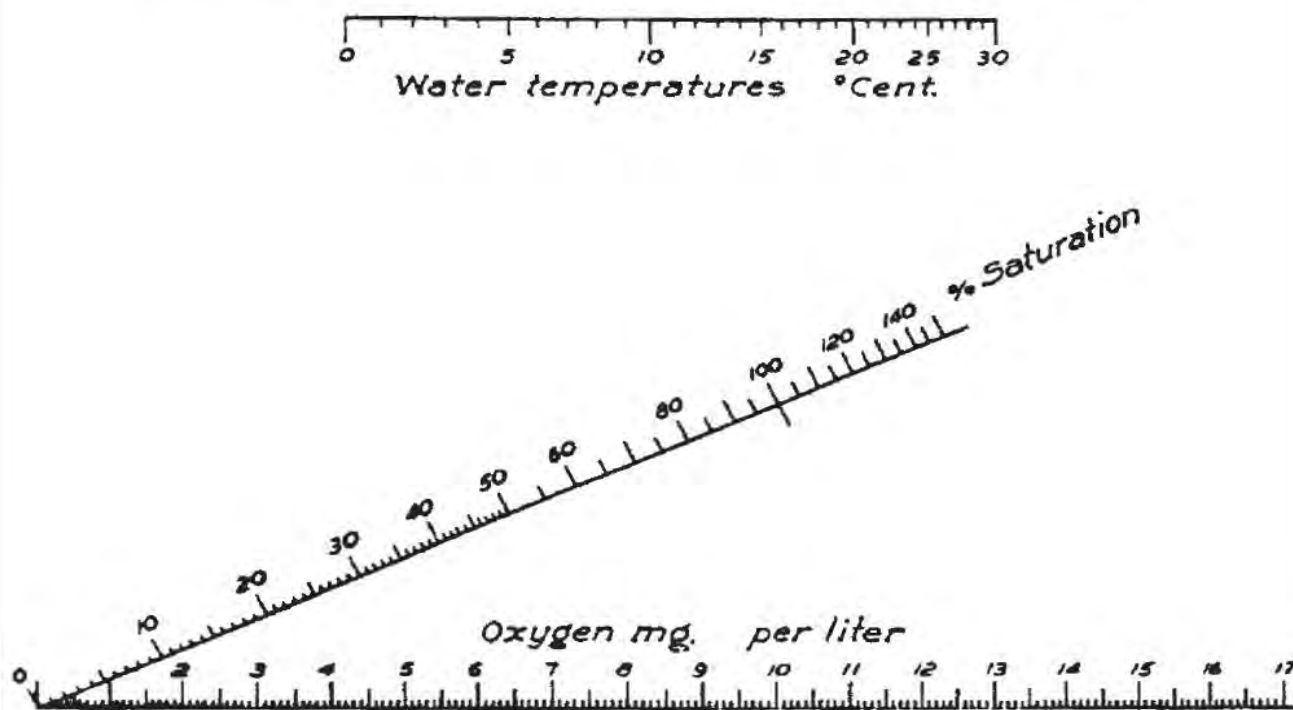
9 – 15

POOR

This stream may only support a few species of insects that are highly tolerant to pollution. The stream is not stable and will get worse without human restoration. Habitat can be improved by planting vegetation near the stream, stabilizing erosion, or reducing water from paved areas.

Stream Corridor Habitat Rating: Marginal

FINDING THE PERCENT SATURATION OF DISSOLVED OXYGEN



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Overall Stream Health Assessment

Record your ratings from all three of the tests above (Physical, Biological, and Chemical) here:

Based on your tests and observations, how would you rate the health of your stream overall?

Assessment	Good	Fair	Marginal	Poor
Stream Corridor Assessment – Physical			X	
Macroinvertebrate Survey – Biological				
Water Quality Tests - Chemical				

Comments:

OVERALL STREAM HEALTH Marginal

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Stream Health Data Sheet

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Stream Site and Stream Investigator's Information

Name (Teacher / Observer)	Date	Time of Day
KD/LP	01/07/2021	Morning
School or Organization Name	Group Members	
Jacobs	N/A	
Stream Study Site Name (used for stream study permit, example: ERMS19 Rocky Gap HS Science Team)		
CATO		
Name of Stream	River or Body of Water (into which stream flows)	
S-KD-008		
Latitude	Longitude	
39.64611 degrees NORTH	-77.47306 degrees WEST	

Weather

Today's Air Temperature: 30 F ° C or ° F	Today's Humidity: _____ %
Today's Cloud Cover: X Clear _____ Partly Cloudy _____ Cloudy	Yesterday's Precipitation: https://water.weather.gov/precip/ 0 _____ Inches
How could yesterday's weather affect today's field investigation?	
No effect	
PREDICTION: Do you think this stream is healthy or unhealthy? Support your prediction and explain why you think so.	
Healthy. Wide forested riparian buffer and adjacent wetlands.	

Stream Health Assessment: Instructions

Next, use the three stream assessments in this data sheet to guide your investigations. At the end of each section, you will use your tests and observations to give your stream a rating for that individual assessment. Then, at the end, use the results from all three assessments to determine an overall stream health rating. How does this rating compare with the prediction you made above?

Physical Assessment: Stream Corridor Assessment

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CHARACTERISTIC	Good (4)	Fair (3)	Marginal (2)	Poor (1)	Score
Floodplain Vegetation	Lots of plants, bushes, and trees along banks and floodplain.	Some plants, bushes, and trees along banks and floodplain.	Most trees and bushes are gone.	Very little plant life at all along banks and floodplain.	3
Channel Alteration	Channel formed by natural processes and allowed to bend often around rocks and wood.	Channel straightened in some places but some natural bends are still present.	Channel mostly straightened but vegetation still present and no cement.	Channel straightened and flowing along a paved channel.	4
Embeddedness – Are there rocks on the bottom covered in silt?	Rocks and cobbles cover almost all of the stream bed. Very little sand or silt between rocks.	Rocks and cobbles cover most of the stream bed. Some sand/silt between and on rocks.	Rocks and cobbles more than halfway buried (embedded) into sand/silt.	Rocks and cobbles entirely buried by sand and silt.	4
Erosion	Banks only slightly above the surface of the water.	Banks somewhat higher above the surface of the water.	Banks significantly above the surface of the water.	Banks extremely high compared to water surface.	3
Attachment Sites for Macroinvertebrates	Lots of different sized rocks, wood, and plenty of leaf litter.	Only small, gravel sized rocks, some wood and leaf litter present.	No rocks or wood but some leaf litter present.	No rocks, no wood, no leaf litter present.	4
Shelter for Fish	Lots of pools, woody debris, and undercut banks present in the water.	Some pools, wood, and undercut banks present.	Few pools, wood, and undercut banks present.	No pools, no wood, no undercut banks present in the water.	1
Riparian Buffer Width (Estimate or Measure)	More than 50ft of trees and brushy vegetation extending out from EACH bank of the stream.	20-50ft of trees and brushy vegetation extending out from EACH bank of the stream.	5-20ft of trees and brushy vegetation extending out from EACH bank of the stream.	0-5ft of trees and brushy vegetation extending out from EACH bank of the stream.	4

CHARATERISTIC	Good (4)	Fair (3)	Marginal (2)	Poor (1)	Score
Bank Stability – Are the banks of the stream eroding or could they easily erode?	Lots of roots and vegetation or large rocks on the vertical portion of the bank all the way down to the surface of the water.	Roots and vegetation or large rocks/boulders covering the vertical part of the bank 2/3 of the way down to the surface of the water.	Roots, vegetation and/or large rocks/boulders going only 1/3 of the way down vertical part of bank to surface of the water.	Steep banks of bare soil with no plants or roots or large rocks.	3
Velocity and Depth – Within 30ft upstream and 30ft downstream from where you are standing There are no pictures for this category.	Stream has areas of (1) fast/deep water, (2) fast/shallow water, (3) slow/shallow areas, or (4) slow/deep areas.	Stream has 3 of the 4 types of speed and depth combinations.	Stream has 2 of the 4 types of speed and depth combinations.	Stream has only 1 type of velocity and depth combination.	2
Add all scores to get a total. Total Score for Stream					28

ANALYSIS:

If the total score is:

Then the overall stream rating is:

30 - 36

GOOD

This stream has excellent habitat with a wide variety of traits. If the water quality is good this stream can support many different species of insects and fish, including those sensitive to pollution and habitat changes. The stream is stable; habitat quality will not get worse unless humans make changes to the area.

23 – 29

FAIR

This stream has good habitat for many different species of insects and fish, including some sensitive to pollution and habitat changes. The stream is most likely stable. Minor changes can increase the habitat quality, such as stabilizing erosion or planting vegetation.

16 – 22

MARGINAL

This stream can support some species of insects and fish that are tolerant to pollution. The stream is not stable and will get worse without human restoration. Habitat can be improved by planting vegetation near the stream, stabilizing erosion, or reducing water from impervious surfaces.

9 – 15

POOR

This stream may only support a few species of insects that are highly tolerant to pollution. The stream is not stable and will get worse without human restoration. Habitat can be improved by planting vegetation near the stream, stabilizing erosion, or reducing water from paved areas.

Stream Corridor Habitat Rating: Fair

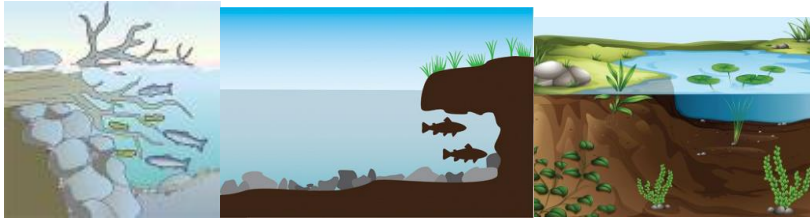
Biological Assessment: Macroinvertebrate Survey

Collection Method

Kick seine or D-Net (circle the method used)

If using a kick seine, collect 3 samples.

If using a D-Net, collect 20 samples and record the number of samples taken from each of the habitat areas in the table to the right.



Benthic Habitat Sampled

Habitat	# of Samples
Riffle	
Root wads/Woody debris/Leaf pack	
Submerged vegetation	
Undercut banks	
Other (Specify):	
TOTAL	20

Your Stream's Biotic Index

Check all of the macroinvertebrates that you find in your stream and calculate the stream's water quality rating. (You may also record the number of each captured, but to calculate the rating at the bottom, only count each KIND of animal once, regardless of the quantity found).

✓	Sensitive	✓	Less Sensitive	✓	Somewhat Tolerant	✓	Tolerant
	Case maker caddisflies		Net-spinning caddisflies		Freshwater clams		Aquatic sow bugs
	Mayflies		Crane flies		Freshwater mussels		Black flies
	Stoneflies		Dragonflies		Planarian		Midge flies
	Water pennies		Riffle beetles		Gilled snails		Leeches
	Hellgrammites				Crayfish		Lunged Snails
					Scuds		Damselflies
							Aquatic worms
# of checkmarks		# of checkmarks		# of checkmarks		# of checkmarks	
_____		_____		_____		_____	
# above x 3 =		# above x 2 =		# above x 1 =		# above x 0 =	
_____		_____		_____		_____	

Biological Water Quality Rating:

Add up the numbers you calculated for all four categories above. Write the total number here: _____

Circle the rating that corresponds to the total of your columns.

Good: >22

Fair: 17 – 22

Marginal: 11 – 16

Poor: <11

Explore and Restore Maryland Streams ratings correspond with the Maryland Biological Stream Survey (MBSS) and Maryland Stream Waders ratings of streams found on the Stream Health website. Stream sites rated **Good** are shown there in green, **Fair** in yellow, and **Marginal/Poor** in red.

Sizes shown are for mature larvae/nymphs or adult animals, but individuals in earlier stages of development may be significantly smaller

Explore & Restore Maryland Streams Key to Stream Macroinvertebrates

Companion to the Explore & Restore Stream Health Data Sheet



NO LEGS

Shell

No shell

Single

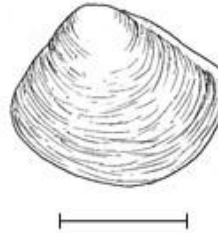
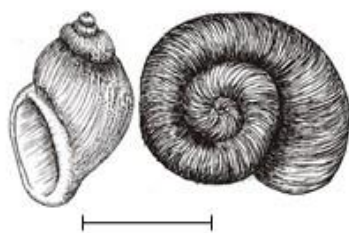
Double

Gilled snail
Spiral, open on right

Lunged snail
Spiral with opening on left or coiled

Clam
Small, whitish tan or brown

Mussel
Large (upto 5"), elongate, dark in color



Leech
Suckers, expands and contracts, soft, slimy body

Midge
Dark head, body white, gray or reddish

Aquatic worm
Small, hair-like or thicker like earthworm, can reach 2 1/2" long

Black fly
Black head, shaped like a bowling pin

Crane fly
Plump, grub-like, often can see guts

Planaria
Flat, triangular head, soft, unsegmented body



Sizes shown are for mature larvae/nymphs or adult animals, but individuals in earlier stages of development may be significantly smaller

Explore & Restore Maryland Streams Key to Stream Macroinvertebrates

Companion to the Explore & Restore Stream Health Data Sheet



LEGS

10+ legs

3 pairs of legs

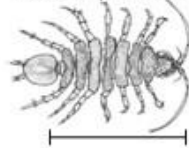
Crayfish

Lobster-like, can reach 6" long



Aquatic sowbug

Two long antennae, flatter top to bottom



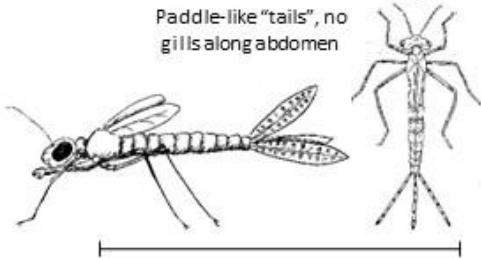
Scud

Shrimp-like, swims on side



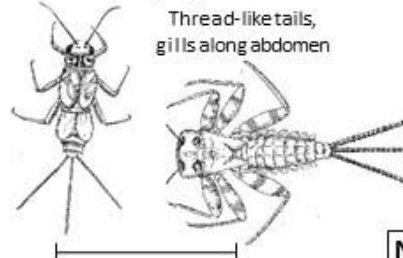
Damselfly

Paddle-like "tails", no gills along abdomen



Mayfly

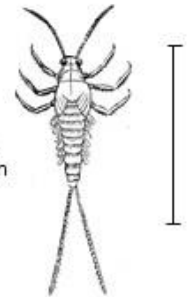
Thread-like tails, gills along abdomen



2 tails

Mayfly

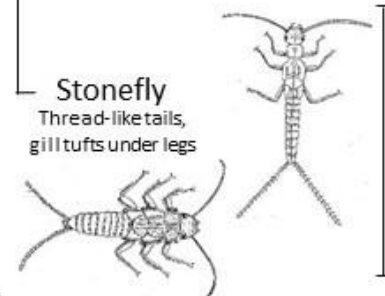
Thread-like tails, gills along abdomen



3 tails

Stonefly

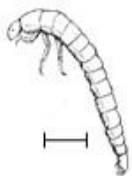
Thread-like tails, gill tufts under legs



No obvious tails

Riffle beetle

Larva- Brown, hardened body, no gills on abdomen



Adult- small, dark, crawls on bottom



Water penny

Flat, oval disk

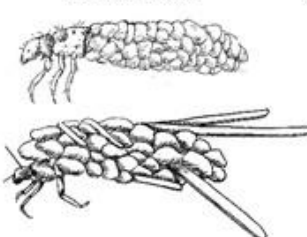


Bottom



Casemaker caddisfly

Maybe housed in a case of sticks, stones, sand or leaves



Net spinning caddisfly

Dark head, tan, green or orangish body, gill tufts may be present on abdomen, 1 or 3 armored plates behind head



Dragonfly

Large eyes, bullet shaped or leaf-like body



Hellgrammite

Large pinching jaws, feelers down sides, can reach 4" long



Chemical Assessment: Water Quality Testing

- (1) Follow instructions provided with each test kit to test different parameters.
- (2) Record your data here:

	Water Temperature (C°)	Dissolved Oxygen (DO) (mg/L)	Dissolved Oxygen (DO) % Saturation <i>See conversion chart</i>	pH	Phosphate (mg/L)	Nitrate (mg/L)	Transparency (cm)	Turbidity (JTU ~ = NTU)	Total Dissolved Solids (TDS) (ppm = mg/L)	Conductivity (µs/cm)
Trial 1										
Trial 2										
Trial 3										

- (3) Circle the corresponding value here:

Water Quality Summation for Chemical Tests				
Parameter	GOOD	FAIR	MARGINAL	POOR
Dissolved Oxygen (DO) (mg/L)	>=7	>=6 - <7	>=5 - <6	<5
pH (units)	>=7 - <=7.5	>=6.5 - <7.0 >7.5 - <=8.5	>=5.5 - <6.5 >8.5 - <=9.0	<5.5 >9.0
Phosphate (PO ₄ X ³) (mg/L)	0 - <=0.1	>0.1 - <=0.2	>0.2 - <=1.0	>1.0
Nitrate (NO ₃) (mg/L)	<1.5	>1.5 - <=2.6	>2.6 - <=3.8	>3.8
Temperature (°F/°C)	Not to exceed > 68°F/20°C			
Transparency (cm)	>=65	<65 - >=35	<35 - >=5	<5
Turbidity (JTU ~ = NTU)	0 - <=4	>4 - <=10	>10 - <=20	>20
Total Dissolved Solids (ppm = mg/L)	0 - <=150	>150 - <=250	>250 - <=350	>350
Conductivity (µs/cm)	0 - <=170	>170 - <=240	>240 - <=500	>500

Water Quality thresholds above are based on [MDE \(Maryland Department of the Environment\)](#) Maryland specific data updated in 2018.

Based on your tests and observations, how would you rate the overall water quality for this stream? For example, if you had some Good, some Poor, but mostly Fair, you might give an overall of Fair.

Chemical Water Quality Rating:

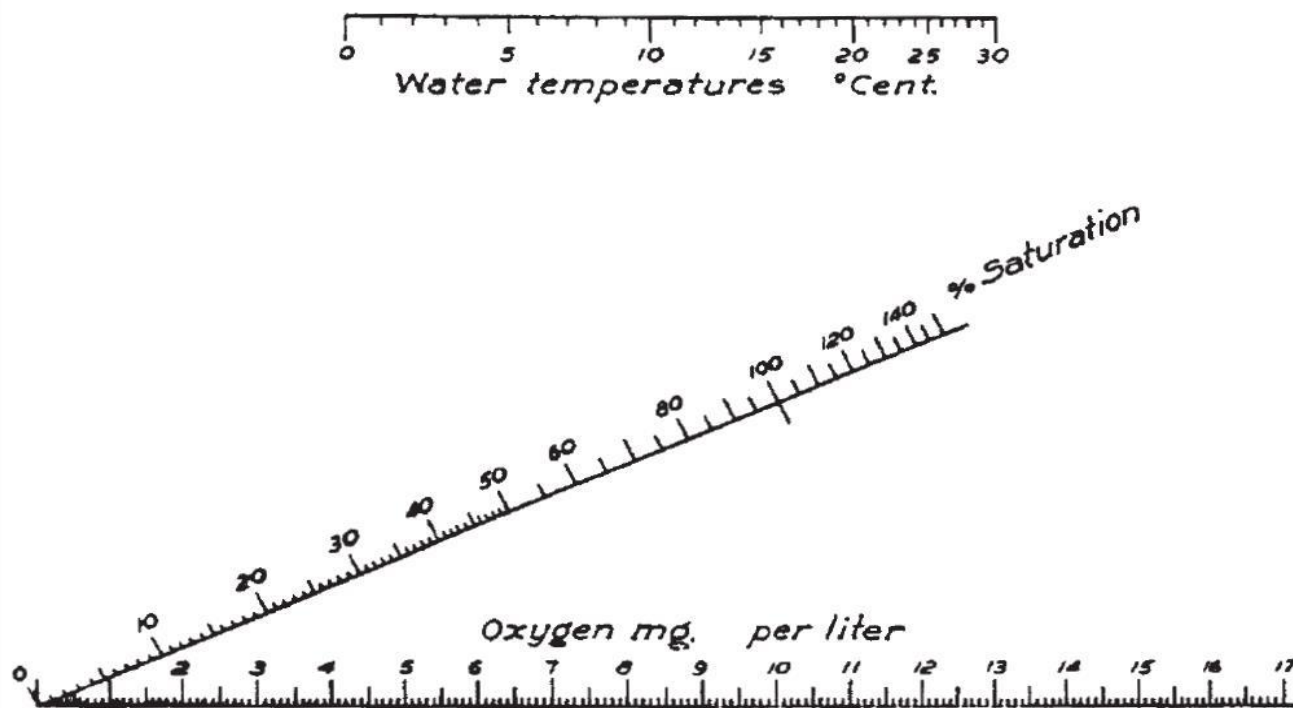
Good

Fair

Marginal

Poor

FINDING THE PERCENT SATURATION OF DISSOLVED OXYGEN



To read this chart, use a straight edge. Place the straight edge on the mg/L of oxygen you have determined for your site, then place the other end of the straight edge on the water temperature you have measured. The point where the straight line passes through the line labeled “% Saturation” is your percent saturation.

Diagram reprinted with permission from M.K. Mitchell and W. B. Stapp, *Field Manual for Water Quality Monitoring*

Overall Stream Health Assessment

Record your ratings from all three of the tests above (Physical, Biological, and Chemical) here:

Based on your tests and observations, how would you rate the health of your stream overall?

Assessment	Good	Fair	Marginal	Poor
Stream Corridor Assessment – Physical		X		
Macroinvertebrate Survey – Biological				
Water Quality Tests - Chemical				

Comments:

OVERALL STREAM HEALTH Fair

This publication was developed under Assistant Agreement No. CB96336601 awarded by the U.S. Environmental Protection Agency. It has not been formally reviewed by EPA. The views expressed are solely those of the Maryland Department of Natural Resources and EPA does not endorse any products or commercial services mentioned.

“Explore and Restore Maryland Streams” – Maryland Department of Natural Resources - 2019



Stream Health Data Sheet

Record information on this sheet as you conduct assessments to determine overall health of your stream. There are three stream assessments for this investigation: (1) **physical**, rating the condition of the stream habitat based on observable characteristics; (2) **biological**, using living animals present to indicate stream health; and (3) **chemical**, testing the water quality based on the chemical content of the stream. Use all three to get a more thorough rating of your stream's health. You may share your findings and compare data with others on the [Maryland Student Stream Health](#) map.

Stream Site and Stream Investigator's Information

Name (Teacher / Observer) KD/LP	Date 01/08/2021	Time of Day Morning
School or Organization Name Jacobs	Group Members N/A	
Stream Study Site Name (used for stream study permit, example: ERMS19 Rocky Gap HS Science Team) CATO		
Name of Stream S-KD-009	River or Body of Water (into which stream flows)	
Latitude 39.64583 degrees NORTH	Longitude -77.45917 degrees WEST	

Weather

Today's Air Temperature: 32 F ° C or ° F	Today's Humidity: _____ %
Today's Cloud Cover: <input checked="" type="checkbox"/> Clear _____ Partly Cloudy _____ Cloudy	Yesterday's Precipitation: https://water.weather.gov/precip/ 0 _____ Inches
How could yesterday's weather affect today's field investigation? No effect	
PREDICTION: Do you think this stream is healthy or unhealthy? Support your prediction and explain why you think so. Healthy; however, forested riparian buffer contains invasive sp. (J. barberry, J. stiltgrass)	

Stream Health Assessment: Instructions

Next, use the three stream assessments in this data sheet to guide your investigations. At the end of each section, you will use your tests and observations to give your stream a rating for that individual assessment. Then, at the end, use the results from all three assessments to determine an overall stream health rating. How does this rating compare with the prediction you made above?

Physical Assessment: Stream Corridor Assessment

Based on Stream Corridor Assessment protocols developed by Kenneth Yetman, adapted by Amanda Sullivan and Alison Armocida, MD Department of Natural Resources.

Instructions: Observe the stream habitat in and around the water and use the accompanying Stream Corridor Assessment [photographs](#) to rank each characteristic. Based on your findings, you will give your stream habitat a rating.

CHARACTERISTIC	Good (4)	Fair (3)	Marginal (2)	Poor (1)	Score
Floodplain Vegetation	Lots of plants, bushes, and trees along banks and floodplain.	Some plants, bushes, and trees along banks and floodplain.	Most trees and bushes are gone.	Very little plant life at all along banks and floodplain.	3
Channel Alteration	Channel formed by natural processes and allowed to bend often around rocks and wood.	Channel straightened in some places but some natural bends are still present.	Channel mostly straightened but vegetation still present and no cement.	Channel straightened and flowing along a paved channel.	4
Embeddedness – Are there rocks on the bottom covered in silt?	Rocks and cobbles cover almost all of the stream bed. Very little sand or silt between rocks.	Rocks and cobbles cover most of the stream bed. Some sand/silt between and on rocks.	Rocks and cobbles more than halfway buried (embedded) into sand/silt.	Rocks and cobbles entirely buried by sand and silt.	4
Erosion	Banks only slightly above the surface of the water.	Banks somewhat higher above the surface of the water.	Banks significantly above the surface of the water.	Banks extremely high compared to water surface.	4
Attachment Sites for Macroinvertebrates	Lots of different sized rocks, wood, and plenty of leaf litter.	Only small, gravel sized rocks, some wood and leaf litter present.	No rocks or wood but some leaf litter present.	No rocks, no wood, no leaf litter present.	4
Shelter for Fish	Lots of pools, woody debris, and undercut banks present in the water.	Some pools, wood, and undercut banks present.	Few pools, wood, and undercut banks present.	No pools, no wood, no undercut banks present in the water.	3
Riparian Buffer Width (Estimate or Measure)	More than 50ft of trees and brushy vegetation extending out from EACH bank of the stream.	20-50ft of trees and brushy vegetation extending out from EACH bank of the stream.	5-20ft of trees and brushy vegetation extending out from EACH bank of the stream.	0-5ft of trees and brushy vegetation extending out from EACH bank of the stream.	2

CHARATERISTIC	Good (4)	Fair (3)	Marginal (2)	Poor (1)	Score
Bank Stability – Are the banks of the stream eroding or could they easily erode?	Lots of roots and vegetation or large rocks on the vertical portion of the bank all the way down to the surface of the water.	Roots and vegetation or large rocks/boulders covering the vertical part of the bank 2/3 of the way down to the surface of the water.	Roots, vegetation and/or large rocks/boulders going only 1/3 of the way down vertical part of bank to surface of the water.	Steep banks of bare soil with no plants or roots or large rocks.	4
Velocity and Depth – Within 30ft upstream and 30ft downstream from where you are standing There are no pictures for this category.	Stream has areas of (1) fast/deep water, (2) fast/shallow water, (3) slow/shallow areas, or (4) slow/deep areas.	Stream has 3 of the 4 types of speed and depth combinations.	Stream has 2 of the 4 types of speed and depth combinations.	Stream has only 1 type of velocity and depth combination.	3
Add all scores to get a total. Total Score for Stream					31

ANALYSIS:

If the total score is:

Then the overall stream rating is:

30 - 36

GOOD

This stream has excellent habitat with a wide variety of traits. If the water quality is good this stream can support many different species of insects and fish, including those sensitive to pollution and habitat changes. The stream is stable; habitat quality will not get worse unless humans make changes to the area.

23 – 29

FAIR

This stream has good habitat for many different species of insects and fish, including some sensitive to pollution and habitat changes. The stream is most likely stable. Minor changes can increase the habitat quality, such as stabilizing erosion or planting vegetation.

16 – 22

MARGINAL

This stream can support some species of insects and fish that are tolerant to pollution. The stream is not stable and will get worse without human restoration. Habitat can be improved by planting vegetation near the stream, stabilizing erosion, or reducing water from impervious surfaces.

9 – 15

POOR

This stream may only support a few species of insects that are highly tolerant to pollution. The stream is not stable and will get worse without human restoration. Habitat can be improved by planting vegetation near the stream, stabilizing erosion, or reducing water from paved areas.

Stream Corridor Habitat Rating: Good

Stream Health Data Sheet

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Stream Site and Stream Investigator's Information

Name (Teacher / Observer)	Date	Time of Day
KD/LP	01/08/2021	Morning
School or Organization Name	Group Members	
Jacobs	N/A	
Stream Study Site Name (used for stream study permit, example: ERMS19 Rocky Gap HS Science Team)		
CATO		
Name of Stream	River or Body of Water (into which stream flows)	
S-KD-010		
Latitude	Longitude	
39.63583 degrees NORTH	-77.45139 degrees WEST	

Weather

Today's Air Temperature: 30 F ° C or ° F	Today's Humidity: _____ %
Today's Cloud Cover: <input type="checkbox"/> Clear <input checked="" type="checkbox"/> Partly Cloudy <input type="checkbox"/> Cloudy	Yesterday's Precipitation: https://water.weather.gov/precip/ 0 _____ Inches
How could yesterday's weather affect today's field investigation?	
No effect	
PREDICTION: Do you think this stream is healthy or unhealthy? Support your prediction and explain why you think so.	
Healthy. Forested riparian buffer and adjacent wetlands, but may be impacted from roadway in close proximity.	

Stream Health Assessment: Instructions

Next, use the three stream assessments in this data sheet to guide your investigations. At the end of each section, you will use your tests and observations to give your stream a rating for that individual assessment. Then, at the end, use the results from all three assessments to determine an overall stream health rating. How does this rating compare with the prediction you made above?

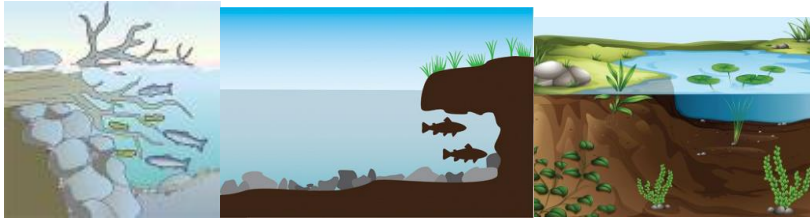
Biological Assessment: Macroinvertebrate Survey

Collection Method

Kick seine or D-Net (circle the method used)

If using a kick seine, collect 3 samples.

If using a D-Net, collect 20 samples and record the number of samples taken from each of the habitat areas in the table to the right.



Benthic Habitat Sampled

Habitat	# of Samples
Riffle	
Root wads/Woody debris/Leaf pack	
Submerged vegetation	
Undercut banks	
Other (Specify):	
TOTAL	20

Your Stream's Biotic Index

Check all of the macroinvertebrates that you find in your stream and calculate the stream's water quality rating. (You may also record the number of each captured, but to calculate the rating at the bottom, only count each KIND of animal once, regardless of the quantity found).

✓	Sensitive	✓	Less Sensitive	✓	Somewhat Tolerant	✓	Tolerant
	Case maker caddisflies		Net-spinning caddisflies		Freshwater clams		Aquatic sow bugs
	Mayflies		Crane flies		Freshwater mussels		Black flies
	Stoneflies		Dragonflies		Planarian		Midge flies
	Water pennies		Riffle beetles		Gilled snails		Leeches
	Hellgrammites				Crayfish		Lunged Snails
					Scuds		Damselflies
							Aquatic worms
# of checkmarks		# of checkmarks		# of checkmarks		# of checkmarks	
_____		_____		_____		_____	
# above x 3 =		# above x 2 =		# above x 1 =		# above x 0 =	
_____		_____		_____		_____	

Biological Water Quality Rating:

Add up the numbers you calculated for all four categories above. Write the total number here: _____

Circle the rating that corresponds to the total of your columns.

Good: >22

Fair: 17 – 22

Marginal: 11 – 16

Poor: <11

Explore and Restore Maryland Streams ratings correspond with the Maryland Biological Stream Survey (MBSS) and Maryland Stream Waders ratings of streams found on the Stream Health website. Stream sites rated **Good** are shown there in green, **Fair** in yellow, and **Marginal/Poor** in red.

Sizes shown are for mature larvae/nymphs or adult animals, but individuals in earlier stages of development may be significantly smaller

Explore & Restore Maryland Streams Key to Stream Macroinvertebrates

Companion to the Explore & Restore Stream Health Data Sheet



NO LEGS

Shell

No shell

Single

Double

Gilled snail

Spiral, open on right



Lunged snail

Spiral with opening on left or coiled



Clam

Small, whitish tan or brown



Mussel

Large (upto 5"), elongate, dark in color



Leech

Suckers, expands and contracts, soft, slimy body



Midge

Dark head, body white, gray or reddish



Aquatic worm

Small, hair-like or thicker like earthworm, can reach 2 1/2" long



Black fly

Black head, shaped like a bowling pin



Crane fly

Plump, grub-like, often can see guts



Planaria

Flat, triangular head, soft, unsegmented body



Sizes shown are for mature larvae/nymphs or adult animals, but individuals in earlier stages of development may be significantly smaller

Explore & Restore Maryland Streams Key to Stream Macroinvertebrates

Companion to the Explore & Restore Stream Health Data Sheet



LEGS

10+ legs

3 pairs of legs

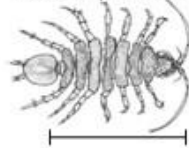
Crayfish

Lobster-like, can reach 6" long



Aquatic sowbug

Two long antennae, flatter top to bottom



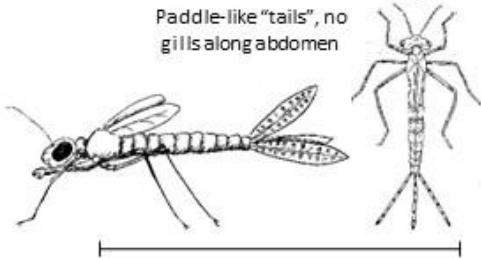
Scud

Shrimp-like, swims on side



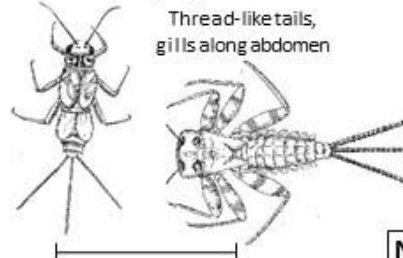
Damselfly

Paddle-like "tails", no gills along abdomen



Mayfly

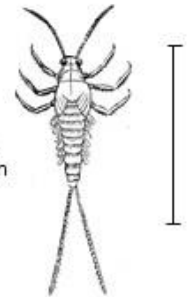
Thread-like tails, gills along abdomen



2 tails

Mayfly

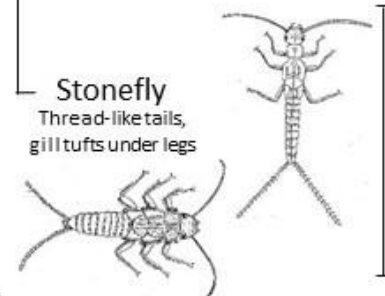
Thread-like tails, gills along abdomen



3 tails

Stonefly

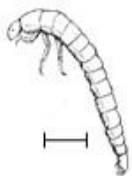
Thread-like tails, gill tufts under legs



No obvious tails

Riffle beetle

Larva- Brown, hardened body, no gills on abdomen

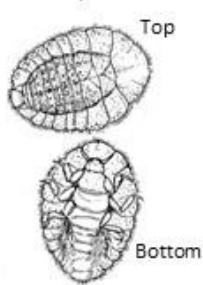


Adult- small, dark, crawls on bottom



Water penny

Flat, oval disk



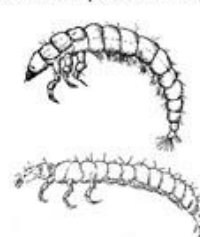
Casemaker caddisfly

Maybe housed in a case of sticks, stones, sand or leaves



Net spinning caddisfly

Dark head, tan, green or orangish body, gill tufts may be present on abdomen, 1 or 3 armored plates behind head



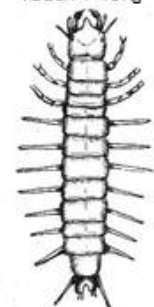
Dragonfly

Large eyes, bullet shaped or leaf-like body



Hellgrammite

Large pinching jaws, feelers down sides, can reach 4" long



Chemical Assessment: Water Quality Testing

- (1) Follow instructions provided with each test kit to test different parameters.
- (2) Record your data here:

	Water Temperature (C°)	Dissolved Oxygen (DO) (mg/L)	Dissolved Oxygen (DO) % Saturation <i>See conversion chart</i>	pH	Phosphate (mg/L)	Nitrate (mg/L)	Transparency (cm)	Turbidity (JTU ~ = NTU)	Total Dissolved Solids (TDS) (ppm = mg/L)	Conductivity (µs/cm)
Trial 1										
Trial 2										
Trial 3										

- (3) Circle the corresponding value here:

Water Quality Summation for Chemical Tests				
Parameter	GOOD	FAIR	MARGINAL	POOR
Dissolved Oxygen (DO) (mg/L)	>=7	>=6 - <7	>=5 - <6	<5
pH (units)	>=7 - <=7.5	>=6.5 - <7.0 >7.5 - <=8.5	>=5.5 - <6.5 >8.5 - <=9.0	<5.5 >9.0
Phosphate (PO ₄ X ³) (mg/L)	0 - <=0.1	>0.1 - <=0.2	>0.2 - <=1.0	>1.0
Nitrate (NO ³) (mg/L)	<1.5	>1.5 - <=2.6	>2.6 - <=3.8	>3.8
Temperature (°F/°C)	Not to exceed > 68°F/20°C			
Transparency (cm)	>=65	<65 - >=35	<35 - >=5	<5
Turbidity (JTU ~ = NTU)	0 - <=4	>4 - <=10	>10 - <=20	>20
Total Dissolved Solids (ppm = mg/L)	0 - <=150	>150 - <=250	>250 - <=350	>350
Conductivity (µs/cm)	0 - <=170	>170 - <=240	>240 - <=500	>500

Water Quality thresholds above are based on [MDE \(Maryland Department of the Environment\)](#) Maryland specific data updated in 2018.

Based on your tests and observations, how would you rate the overall water quality for this stream? For example, if you had some Good, some Poor, but mostly Fair, you might give an overall of Fair.

Chemical Water Quality Rating:

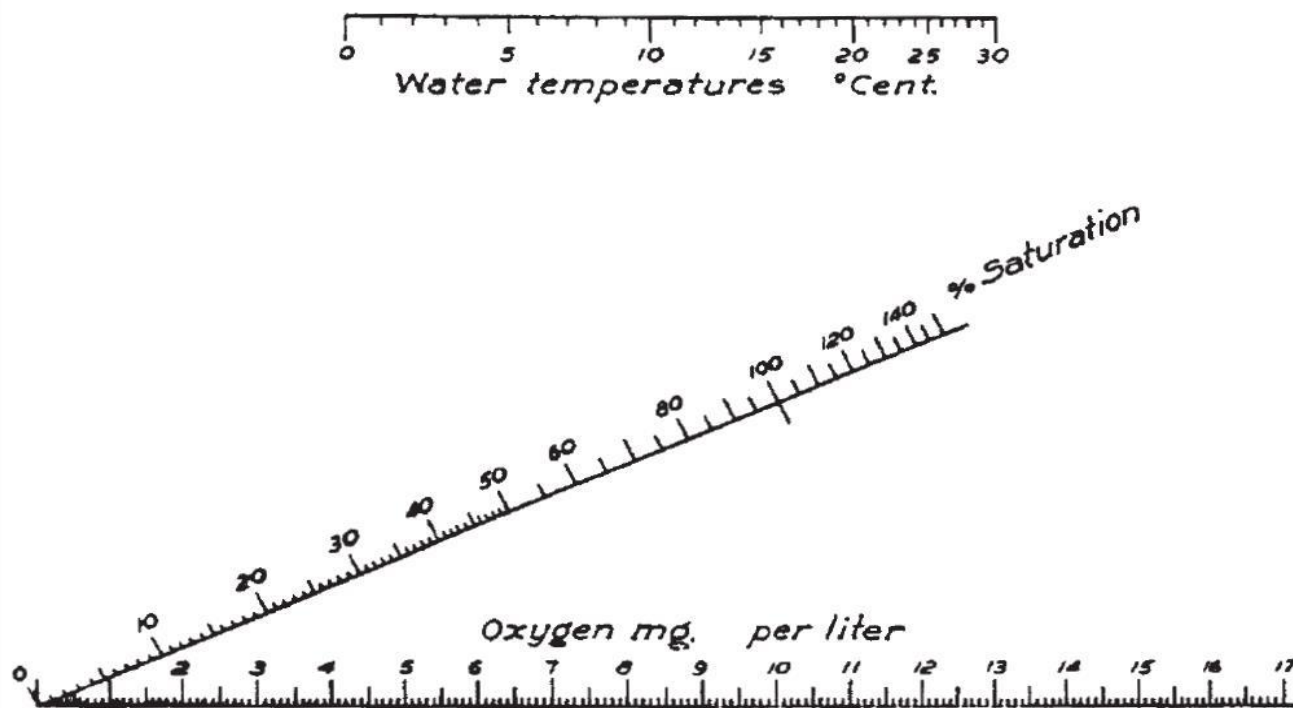
Good

Fair

Marginal

Poor

FINDING THE PERCENT SATURATION OF DISSOLVED OXYGEN



To read this chart, use a straight edge. Place the straight edge on the mg/L of oxygen you have determined for your site, then place the other end of the straight edge on the water temperature you have measured. The point where the straight line passes through the line labeled “% Saturation” is your percent saturation.

Diagram reprinted with permission from M.K. Mitchell and W. B. Stapp, *Field Manual for Water Quality Monitoring*

Overall Stream Health Assessment

Record your ratings from all three of the tests above (Physical, Biological, and Chemical) here:

Based on your tests and observations, how would you rate the health of your stream overall?

Assessment	Good	Fair	Marginal	Poor
Stream Corridor Assessment – Physical		X		
Macroinvertebrate Survey – Biological				
Water Quality Tests - Chemical				

Comments:

OVERALL STREAM HEALTH Fair

This publication was developed under Assistant Agreement No. CB96336601 awarded by the U.S. Environmental Protection Agency. It has not been formally reviewed by EPA. The views expressed are solely those of the Maryland Department of Natural Resources and EPA does not endorse any products or commercial services mentioned.

“Explore and Restore Maryland Streams” – Maryland Department of Natural Resources - 2019



Physical Assessment: Stream Corridor Assessment

Based on Stream Corridor Assessment protocols developed by Kenneth Yetman, adapted by Amanda Sullivan and Alison Armocida, MD Department of Natural Resources.

Instructions: Observe the stream habitat in and around the water and use the accompanying Stream Corridor Assessment [photographs](#) to rank each characteristic. Based on your findings, you will give your stream habitat a rating.

CHARACTERISTIC	Good (4)	Fair (3)	Marginal (2)	Poor (1)	Score
Floodplain Vegetation	Lots of plants, bushes, and trees along banks and floodplain.	Some plants, bushes, and trees along banks and floodplain.	Most trees and bushes are gone.	Very little plant life at all along banks and floodplain.	3
Channel Alteration	Channel formed by natural processes and allowed to bend often around rocks and wood.	Channel straightened in some places but some natural bends are still present.	Channel mostly straightened but vegetation still present and no cement.	Channel straightened and flowing along a paved channel.	4
Embeddedness – Are there rocks on the bottom covered in silt?	Rocks and cobbles cover almost all of the stream bed. Very little sand or silt between rocks.	Rocks and cobbles cover most of the stream bed. Some sand/silt between and on rocks.	Rocks and cobbles more than halfway buried (embedded) into sand/silt.	Rocks and cobbles entirely buried by sand and silt.	3
Erosion	Banks only slightly above the surface of the water.	Banks somewhat higher above the surface of the water.	Banks significantly above the surface of the water.	Banks extremely high compared to water surface.	4
Attachment Sites for Macroinvertebrates	Lots of different sized rocks, wood, and plenty of leaf litter.	Only small, gravel sized rocks, some wood and leaf litter present.	No rocks or wood but some leaf litter present.	No rocks, no wood, no leaf litter present.	3
Shelter for Fish	Lots of pools, woody debris, and undercut banks present in the water.	Some pools, wood, and undercut banks present.	Few pools, wood, and undercut banks present.	No pools, no wood, no undercut banks present in the water.	1
Riparian Buffer Width (Estimate or Measure)	More than 50ft of trees and brushy vegetation extending out from EACH bank of the stream.	20-50ft of trees and brushy vegetation extending out from EACH bank of the stream.	5-20ft of trees and brushy vegetation extending out from EACH bank of the stream.	0-5ft of trees and brushy vegetation extending out from EACH bank of the stream.	2

CHARATERISTIC	Good (4)	Fair (3)	Marginal (2)	Poor (1)	Score
Bank Stability – Are the banks of the stream eroding or could they easily erode?	Lots of roots and vegetation or large rocks on the vertical portion of the bank all the way down to the surface of the water.	Roots and vegetation or large rocks/boulders covering the vertical part of the bank 2/3 of the way down to the surface of the water.	Roots, vegetation and/or large rocks/boulders going only 1/3 of the way down vertical part of bank to surface of the water.	Steep banks of bare soil with no plants or roots or large rocks.	3
Velocity and Depth – Within 30ft upstream and 30ft downstream from where you are standing There are no pictures for this category.	Stream has areas of (1) fast/deep water, (2) fast/shallow water, (3) slow/shallow areas, or (4) slow/deep areas.	Stream has 3 of the 4 types of speed and depth combinations.	Stream has 2 of the 4 types of speed and depth combinations.	Stream has only 1 type of velocity and depth combination.	1
Add all scores to get a total. Total Score for Stream					24

ANALYSIS:

If the total score is:

Then the overall stream rating is:

30 - 36

GOOD

This stream has excellent habitat with a wide variety of traits. If the water quality is good this stream can support many different species of insects and fish, including those sensitive to pollution and habitat changes. The stream is stable; habitat quality will not get worse unless humans make changes to the area.

23 – 29

FAIR

This stream has good habitat for many different species of insects and fish, including some sensitive to pollution and habitat changes. The stream is most likely stable. Minor changes can increase the habitat quality, such as stabilizing erosion or planting vegetation.

16 – 22

MARGINAL

This stream can support some species of insects and fish that are tolerant to pollution. The stream is not stable and will get worse without human restoration. Habitat can be improved by planting vegetation near the stream, stabilizing erosion, or reducing water from impervious surfaces.

9 – 15

POOR

This stream may only support a few species of insects that are highly tolerant to pollution. The stream is not stable and will get worse without human restoration. Habitat can be improved by planting vegetation near the stream, stabilizing erosion, or reducing water from paved areas.

Stream Corridor Habitat Rating: Fair

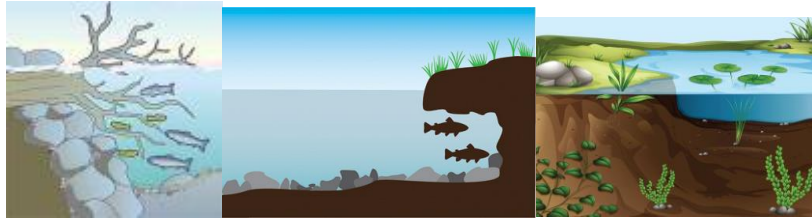
Biological Assessment: Macroinvertebrate Survey

Collection Method

Kick seine or D-Net (circle the method used)

If using a kick seine, collect 3 samples.

If using a D-Net, collect 20 samples and record the number of samples taken from each of the habitat areas in the table to the right.



Benthic Habitat Sampled

Habitat	# of Samples
Riffle	
Root wads/Woody debris/Leaf pack	
Submerged vegetation	
Undercut banks	
Other (Specify):	
TOTAL	20

Your Stream's Biotic Index

Check all of the macroinvertebrates that you find in your stream and calculate the stream's water quality rating. (You may also record the number of each captured, but to calculate the rating at the bottom, only count each KIND of animal once, regardless of the quantity found).

✓	Sensitive	✓	Less Sensitive	✓	Somewhat Tolerant	✓	Tolerant
	Case maker caddisflies		Net-spinning caddisflies		Freshwater clams		Aquatic sow bugs
	Mayflies		Crane flies		Freshwater mussels		Black flies
	Stoneflies		Dragonflies		Planarian		Midge flies
	Water pennies		Riffle beetles		Gilled snails		Leeches
	Hellgrammites				Crayfish		Lunged Snails
					Scuds		Damselflies
							Aquatic worms
# of checkmarks		# of checkmarks		# of checkmarks		# of checkmarks	
_____		_____		_____		_____	
# above x 3 =		# above x 2 =		# above x 1 =		# above x 0 =	
_____		_____		_____		_____	

Biological Water Quality Rating:

Add up the numbers you calculated for all four categories above. Write the total number here: _____

Circle the rating that corresponds to the total of your columns.

Good: >22

Fair: 17 – 22

Marginal: 11 – 16

Poor: <11

Explore and Restore Maryland Streams ratings correspond with the Maryland Biological Stream Survey (MBSS) and Maryland Stream Waders ratings of streams found on the Stream Health website. Stream sites rated **Good** are shown there in green, **Fair** in yellow, and **Marginal/Poor** in red.

Sizes shown are for mature larvae/nymphs or adult animals, but individuals in earlier stages of development may be significantly smaller

Explore & Restore Maryland Streams Key to Stream Macroinvertebrates

Companion to the Explore & Restore Stream Health Data Sheet



NO LEGS

Shell

No shell

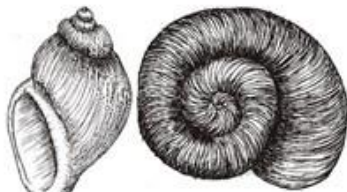
Single

Double

Gilled snail
Spiral, open on right



Lunged snail
Spiral with opening on left or coiled



Clam
Small, whitish tan or brown



Mussel
Large (upto 5"), elongate, dark in color



Leech
Suckers, expands and contracts, soft, slimy body



Midge
Dark head, body white, gray or reddish



Aquatic worm
Small, hair-like or thicker like earthworm, can reach 2 1/2" long



Black fly
Black head, shaped like a bowling pin



Crane fly
Plump, grub-like, often can see guts



Planaria
Flat, triangular head, soft, unsegmented body



Sizes shown are for mature larvae/nymphs or adult animals, but individuals in earlier stages of development may be significantly smaller

Explore & Restore Maryland Streams Key to Stream Macroinvertebrates

Companion to the Explore & Restore Stream Health Data Sheet



LEGS

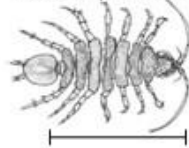
10+ legs

3 pairs of legs

Crayfish
Lobster-like, can reach 6" long



Aquatic sowbug
Two long antennae, flatter top to bottom



Scud
Shrimp-like, swims on side



2 tails

Mayfly
Thread-like tails, gills along abdomen



3 tails

Damselfly

Paddle-like "tails", no gills along abdomen



Mayfly

Thread-like tails, gills along abdomen



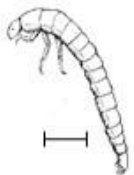
Stonefly
Thread-like tails, gill tufts under legs



No obvious tails

Riffle beetle

Larva- Brown, hardened body, no gills on abdomen



Adult- small, dark, crawls on bottom



Water penny

Flat, oval disk

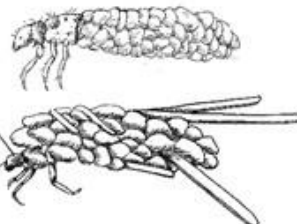


Bottom



Casemaker caddisfly

Maybe housed in a case of sticks, stones, sand or leaves



Net spinning caddisfly

Dark head, tan, green or orangish body, gill tufts may be present on abdomen, 1 or 3 armored plates behind head



Dragonfly

Large eyes, bullet shaped or leaf-like body



Hellgrammite

Large pinching jaws, feelers down sides, can reach 4" long



Chemical Assessment: Water Quality Testing

- (1) Follow instructions provided with each test kit to test different parameters.
- (2) Record your data here:

	Water Temperature (C°)	Dissolved Oxygen (DO) (mg/L)	Dissolved Oxygen (DO) % Saturation <i>See conversion chart</i>	pH	Phosphate (mg/L)	Nitrate (mg/L)	Transparency (cm)	Turbidity (JTU ~ = NTU)	Total Dissolved Solids (TDS) (ppm = mg/L)	Conductivity (µs/cm)
Trial 1										
Trial 2										
Trial 3										

- (3) Circle the corresponding value here:

Water Quality Summation for Chemical Tests				
Parameter	GOOD	FAIR	MARGINAL	POOR
Dissolved Oxygen (DO) (mg/L)	>=7	>=6 - <7	>=5 - <6	<5
pH (units)	>=7 - <=7.5	>=6.5 - <7.0 >7.5 - <=8.5	>=5.5 - <6.5 >8.5 - <=9.0	<5.5 >9.0
Phosphate (PO ₄ X ³) (mg/L)	0 - <=0.1	>0.1 - <=0.2	>0.2 - <=1.0	>1.0
Nitrate (NO ³) (mg/L)	<1.5	>1.5 - <=2.6	>2.6 - <=3.8	>3.8
Temperature (°F/°C)	Not to exceed > 68°F/20°C			
Transparency (cm)	>=65	<65 - >=35	<35 - >=5	<5
Turbidity (JTU ~ = NTU)	0 - <=4	>4 - <=10	>10 - <=20	>20
Total Dissolved Solids (ppm = mg/L)	0 - <=150	>150 - <=250	>250 - <=350	>350
Conductivity (µs/cm)	0 - <=170	>170 - <=240	>240 - <=500	>500

Water Quality thresholds above are based on [MDE \(Maryland Department of the Environment\)](#) Maryland specific data updated in 2018.

Based on your tests and observations, how would you rate the overall water quality for this stream? For example, if you had some Good, some Poor, but mostly Fair, you might give an overall of Fair.

Chemical Water Quality Rating:

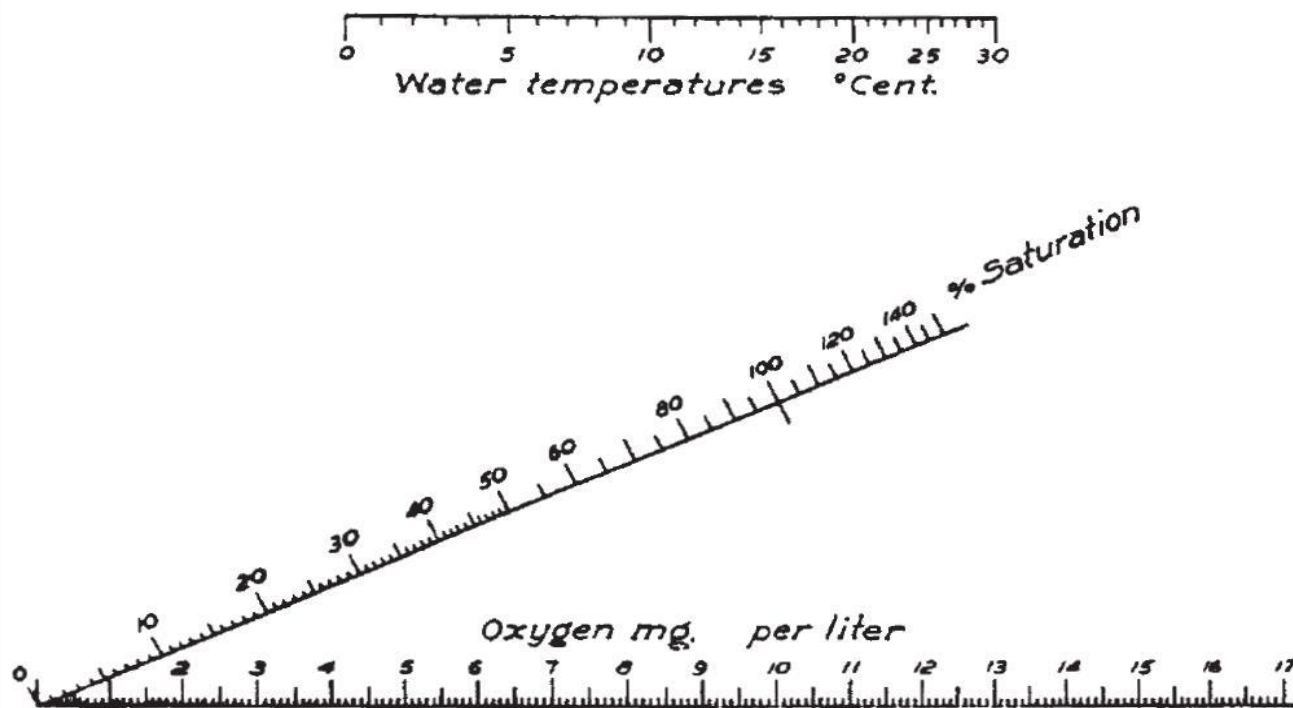
Good

Fair

Marginal

Poor

FINDING THE PERCENT SATURATION OF DISSOLVED OXYGEN



To read this chart, use a straight edge. Place the straight edge on the mg/L of oxygen you have determined for your site, then place the other end of the straight edge on the water temperature you have measured. The point where the straight line passes through the line labeled “% Saturation” is your percent saturation.

Diagram reprinted with permission from M.K. Mitchell and W. B. Stapp, *Field Manual for Water Quality Monitoring*

Overall Stream Health Assessment

Record your ratings from all three of the tests above (Physical, Biological, and Chemical) here:

Based on your tests and observations, how would you rate the health of your stream overall?

Assessment	Good	Fair	Marginal	Poor
Stream Corridor Assessment – Physical		X		
Macroinvertebrate Survey – Biological				
Water Quality Tests - Chemical				

Comments:

OVERALL STREAM HEALTH Fair

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“Explore and Restore Maryland Streams” – Maryland Department of Natural Resources - 2019



Stream Health Data Sheet

Record information on this sheet as you conduct assessments to determine overall health of your stream. There are three stream assessments for this investigation: (1) **physical**, rating the condition of the stream habitat based on observable characteristics; (2) **biological**, using living animals present to indicate stream health; and (3) **chemical**, testing the water quality based on the chemical content of the stream. Use all three to get a more thorough rating of your stream's health. You may share your findings and compare data with others on the [Maryland Student Stream Health](#) map.

Stream Site and Stream Investigator's Information

Name (Teacher / Observer) RR, LP	Date 5/4/2021	Time of Day 9:00 am
School or Organization Name Jacobs	Group Members NA	
Stream Study Site Name (used for stream study permit, example: ERMS19 Rocky Gap HS Science Team) Project Cato		
Name of Stream UNT to Blue Blazes Run	River or Body of Water (into which stream flows) UNT to Blue Blazes Run	
Latitude 39.639325 degrees NORTH	Longitude -77.450194 degrees WEST	
Weather		
Today's Air Temperature: 70 ° C or ° F	Today's Humidity: _____ %	
Today's Cloud Cover: _____ Clear _____ Partly Cloudy _____ ^X Cloudy	Yesterday's Precipitation: https://water.weather.gov/precip/ 0.7 Inches	
How could yesterday's weather affect today's field investigation? No effect.		
PREDICTION: Do you think this stream is healthy or unhealthy? Support your prediction and explain why you think so. Healthy		

Stream Health Assessment: Instructions

Next, use the three stream assessments in this data sheet to guide your investigations. At the end of each section, you will use your tests and observations to give your stream a rating for that individual assessment. Then, at the end, use the results from all three assessments to determine an overall stream health rating. How does this rating compare with the prediction you made above?

Physical Assessment: Stream Corridor Assessment

Based on Stream Corridor Assessment protocols developed by Kenneth Yetman, adapted by Amanda Sullivan and Alison Armocida, MD Department of Natural Resources.

Instructions: Observe the stream habitat in and around the water and use the accompanying Stream Corridor Assessment [photographs](#) to rank each characteristic. Based on your findings, you will give your stream habitat a rating.

CHARACTERISTIC	Good (4)	Fair (3)	Marginal (2)	Poor (1)	Score
Floodplain Vegetation	Lots of plants, bushes, and trees along banks and floodplain.	Some plants, bushes, and trees along banks and floodplain.	Most trees and bushes are gone.	Very little plant life at all along banks and floodplain.	4
Channel Alteration	Channel formed by natural processes and allowed to bend often around rocks and wood.	Channel straightened in some places but some natural bends are still present.	Channel mostly straightened but vegetation still present and no cement.	Channel straightened and flowing along a paved channel.	4
Embeddedness – Are there rocks on the bottom covered in silt?	Rocks and cobbles cover almost all of the stream bed. Very little sand or silt between rocks.	Rocks and cobbles cover most of the stream bed. Some sand/silt between and on rocks.	Rocks and cobbles more than halfway buried (embedded) into sand/silt.	Rocks and cobbles entirely buried by sand and silt.	4
Erosion	Banks only slightly above the surface of the water.	Banks somewhat higher above the surface of the water.	Banks significantly above the surface of the water.	Banks extremely high compared to water surface.	3
Attachment Sites for Macroinvertebrates	Lots of different sized rocks, wood, and plenty of leaf litter.	Only small, gravel sized rocks, some wood and leaf litter present.	No rocks or wood but some leaf litter present.	No rocks, no wood, no leaf litter present.	4
Shelter for Fish	Lots of pools, woody debris, and undercut banks present in the water.	Some pools, wood, and undercut banks present.	Few pools, wood, and undercut banks present.	No pools, no wood, no undercut banks present in the water.	1
Riparian Buffer Width (Estimate or Measure)	More than 50ft of trees and brushy vegetation extending out from EACH bank of the stream.	20-50ft of trees and brushy vegetation extending out from EACH bank of the stream.	5-20ft of trees and brushy vegetation extending out from EACH bank of the stream.	0-5ft of trees and brushy vegetation extending out from EACH bank of the stream.	4

CHARATERISTIC	Good (4)	Fair (3)	Marginal (2)	Poor (1)	Score
Bank Stability – Are the banks of the stream eroding or could they easily erode?	Lots of roots and vegetation or large rocks on the vertical portion of the bank all the way down to the surface of the water.	Roots and vegetation or large rocks/boulders covering the vertical part of the bank 2/3 of the way down to the surface of the water.	Roots, vegetation and/or large rocks/boulders going only 1/3 of the way down vertical part of bank to surface of the water.	Steep banks of bare soil with no plants or roots or large rocks.	3
Velocity and Depth – Within 30ft upstream and 30ft downstream from where you are standing There are no pictures for this category.	Stream has areas of (1) fast/deep water, (2) fast/shallow water, (3) slow/shallow areas, or (4) slow/deep areas.	Stream has 3 of the 4 types of speed and depth combinations.	Stream has 2 of the 4 types of speed and depth combinations.	Stream has only 1 type of velocity and depth combination.	1

Add all scores to get a total. Total Score for Stream 28

ANALYSIS:

If the total score is:

Then the overall stream rating is:

30 - 36

GOOD

This stream has excellent habitat with a wide variety of traits. If the water quality is good this stream can support many different species of insects and fish, including those sensitive to pollution and habitat changes. The stream is stable; habitat quality will not get worse unless humans make changes to the area.

23 – 29

FAIR

This stream has good habitat for many different species of insects and fish, including some sensitive to pollution and habitat changes. The stream is most likely stable. Minor changes can increase the habitat quality, such as stabilizing erosion or planting vegetation.

16 – 22

MARGINAL

This stream can support some species of insects and fish that are tolerant to pollution. The stream is not stable and will get worse without human restoration. Habitat can be improved by planting vegetation near the stream, stabilizing erosion, or reducing water from impervious surfaces.

9 – 15

POOR

This stream may only support a few species of insects that are highly tolerant to pollution. The stream is not stable and will get worse without human restoration. Habitat can be improved by planting vegetation near the stream, stabilizing erosion, or reducing water from paved areas.

Stream Corridor Habitat Rating: Fair

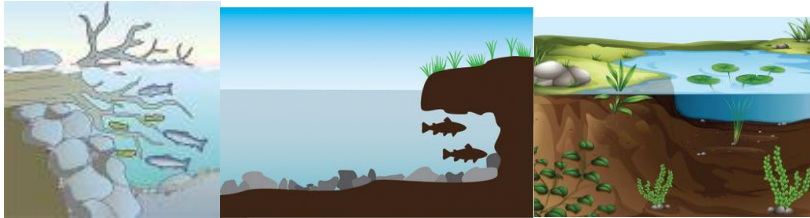
Biological Assessment: Macroinvertebrate Survey

Collection Method

Kick seine or D-Net (circle the method used)

If using a kick seine, collect 3 samples.

If using a D-Net, collect 20 samples and record the number of samples taken from each of the habitat areas in the table to the right.



Benthic Habitat Sampled

Habitat	# of Samples
Riffle	
Root wads/Woody debris/Leaf pack	
Submerged vegetation	
Undercut banks	
Other (Specify):	
TOTAL	20

Your Stream's Biotic Index

Check all of the macroinvertebrates that you find in your stream and calculate the stream's water quality rating. (You may also record the number of each captured, but to calculate the rating at the bottom, only count each KIND of animal once, regardless of the quantity found).

✓	Sensitive	✓	Less Sensitive	✓	Somewhat Tolerant	✓	Tolerant
	Case maker caddisflies		Net-spinning caddisflies		Freshwater clams		Aquatic sow bugs
	Mayflies		Crane flies		Freshwater mussels		Black flies
	Stoneflies		Dragonflies		Planarian		Midge flies
	Water pennies		Riffle beetles		Gilled snails		Leeches
	Hellgrammites				Crayfish		Lunged Snails
					Scuds		Damselflies
							Aquatic worms
# of checkmarks		# of checkmarks		# of checkmarks		# of checkmarks	
_____		_____		_____		_____	
# above x 3 =		# above x 2 =		# above x 1 =		# above x 0 =	
_____		_____		_____		_____	

Biological Water Quality Rating:

Add up the numbers you calculated for all four categories above. Write the total number here: _____

Circle the rating that corresponds to the total of your columns.

Good: >22

Fair: 17 – 22

Marginal: 11 – 16

Poor: <11

Explore and Restore Maryland Streams ratings correspond with the Maryland Biological Stream Survey (MBSS) and Maryland Stream Waders ratings of streams found on the Stream Health website. Stream sites rated **Good** are shown there in green, **Fair** in yellow, and **Marginal/Poor** in red.

Sizes shown are for mature larvae/nymphs or adult animals, but individuals in earlier stages of development may be significantly smaller

Explore & Restore Maryland Streams Key to Stream Macroinvertebrates

Companion to the Explore & Restore Stream Health Data Sheet



NO LEGS

Shell

No shell

Single

Double

Gilled snail

Spiral, open on right



Lunged snail

Spiral with opening on left or coiled



Clam

Small, whitish tan or brown



Mussel

Large (upto 5"), elongate, dark in color



Leech

Suckers, expands and contracts, soft, slimy body



Midge

Dark head, body white, gray or reddish



Aquatic worm

Small, hair-like or thicker like earthworm, can reach 2 1/2" long



Black fly

Black head, shaped like a bowling pin



Crane fly

Plump, grub-like, often can see guts



Planaria

Flat, triangular head, soft, unsegmented body



Sizes shown are for mature larvae/nymphs or adult animals, but individuals in earlier stages of development may be significantly smaller

Explore & Restore Maryland Streams Key to Stream Macroinvertebrates

Companion to the Explore & Restore Stream Health Data Sheet



LEGS

10+ legs

3 pairs of legs

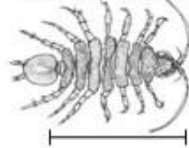
Crayfish

Lobster-like, can reach 6" long



Aquatic sowbug

Two long antennae, flatter top to bottom



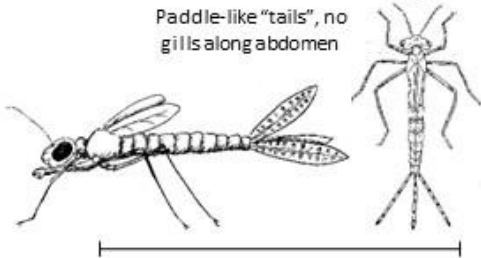
Scud

Shrimp-like, swims on side



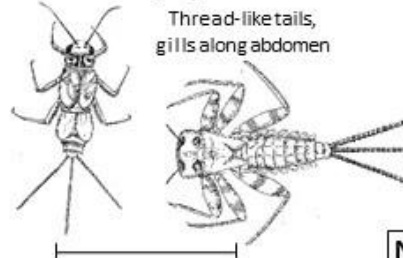
Damselfly

Paddle-like "tails", no gills along abdomen



Mayfly

Thread-like tails, gills along abdomen



2 tails

Mayfly

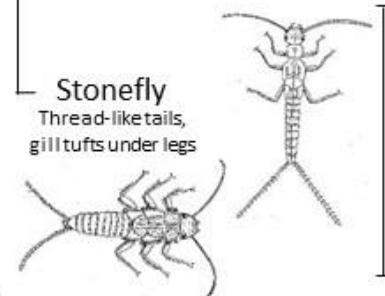
Thread-like tails, gills along abdomen



3 tails

Stonefly

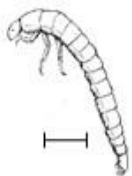
Thread-like tails, gill tufts under legs



No obvious tails

Riffle beetle

Larva- Brown, hardened body, no gills on abdomen



Adult- small, dark, crawls on bottom



Water penny

Flat, oval disk



Bottom



Casemaker caddisfly

Maybe housed in a case of sticks, stones, sand or leaves



Net spinning caddisfly

Dark head, tan, green or orangish body, gill tufts may be present on abdomen, 1 or 3 armored plates behind head



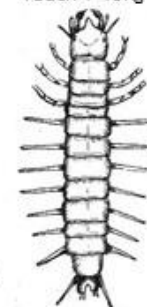
Dragonfly

Large eyes, bullet shaped or leaf-like body



Hellgrammite

Large pinching jaws, feelers down sides, can reach 4" long



Chemical Assessment: Water Quality Testing

- (1) Follow instructions provided with each test kit to test different parameters.
- (2) Record your data here:

	Water Temperature (C°)	Dissolved Oxygen (DO) (mg/L)	Dissolved Oxygen (DO) % Saturation <i>See conversion chart</i>	pH	Phosphate (mg/L)	Nitrate (mg/L)	Transparency (cm)	Turbidity (JTU ~ = NTU)	Total Dissolved Solids (TDS) (ppm = mg/L)	Conductivity (µs/cm)
Trial 1										
Trial 2										
Trial 3										

- (3) Circle the corresponding value here:

Water Quality Summation for Chemical Tests				
Parameter	GOOD	FAIR	MARGINAL	POOR
Dissolved Oxygen (DO) (mg/L)	>=7	>=6 - <7	>=5 - <6	<5
pH (units)	>=7 - <=7.5	>=6.5 - <7.0 >7.5 - <=8.5	>=5.5 - <6.5 >8.5 - <=9.0	<5.5 >9.0
Phosphate (PO ₄ X ³) (mg/L)	0 - <=0.1	>0.1 - <=0.2	>0.2 - <=1.0	>1.0
Nitrate (NO ₃) (mg/L)	<1.5	>1.5 - <=2.6	>2.6 - <=3.8	>3.8
Temperature (°F/°C)	Not to exceed > 68°F/20°C			
Transparency (cm)	>=65	<65 - >=35	<35 - >=5	<5
Turbidity (JTU ~ = NTU)	0 - <=4	>4 - <=10	>10 - <=20	>20
Total Dissolved Solids (ppm = mg/L)	0 - <=150	>150 - <=250	>250 - <=350	>350
Conductivity (µs/cm)	0 - <=170	>170 - <=240	>240 - <=500	>500

Water Quality thresholds above are based on [MDE \(Maryland Department of the Environment\)](#) Maryland specific data updated in 2018.

Based on your tests and observations, how would you rate the overall water quality for this stream? For example, if you had some Good, some Poor, but mostly Fair, you might give an overall of Fair.

Chemical Water Quality Rating:

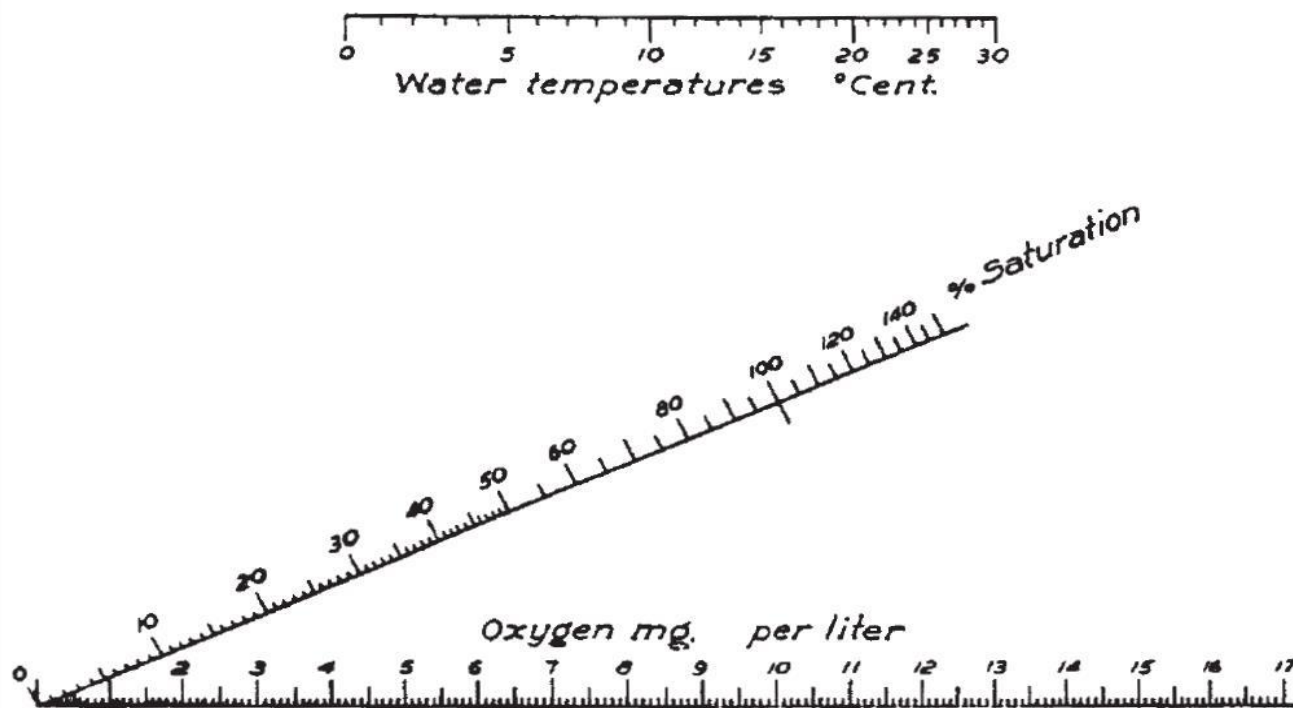
Good

Fair

Marginal

Poor

FINDING THE PERCENT SATURATION OF DISSOLVED OXYGEN



To read this chart, use a straight edge. Place the straight edge on the mg/L of oxygen you have determined for your site, then place the other end of the straight edge on the water temperature you have measured. The point where the straight line passes through the line labeled “% Saturation” is your percent saturation.

Diagram reprinted with permission from M.K. Mitchell and W. B. Stapp, *Field Manual for Water Quality Monitoring*

Overall Stream Health Assessment

Record your ratings from all three of the tests above (Physical, Biological, and Chemical) here:

Based on your tests and observations, how would you rate the health of your stream overall?

Assessment	Good	Fair	Marginal	Poor
Stream Corridor Assessment – Physical		X		
Macroinvertebrate Survey – Biological				
Water Quality Tests - Chemical				

Comments:

OVERALL STREAM HEALTH Fair

This publication was developed under Assistant Agreement No. CB96336601 awarded by the U.S. Environmental Protection Agency. It has not been formally reviewed by EPA. The views expressed are solely those of the Maryland Department of Natural Resources and EPA does not endorse any products or commercial services mentioned.

“Explore and Restore Maryland Streams” – Maryland Department of Natural Resources - 2019





Appendix F – Staff Qualifications

Keith D'Angiolillo, PWS, Permitting Specialist. Keith is a Professional Wetland Scientist with than 29 years of experience and has conducted more than 1,500 environmental studies for a wide range of clients including local, state, tribal and federal government agencies, as well as for the development, legal, engineering, utility, and financial professions. Elements of Keith's wetlands-related projects include: the delineation of wetlands through an analysis of soils, hydrology, vegetation and aerial photography; the characterization of wetland type; the evaluation of associated wetland functions and values; assessment of development-related impacts; impact mitigation; wetlands restoration; permit acquisition and the use of Geographic Information Systems (GIS) in its capacity as an instrument of wetland identification and environmental analysis. Keith specializes in the preparation of permits applications addressing the Section 404 of the Clean Water Act and the regulations regarding Coastal Zone Management. Keith is certified in Winter Vegetation Identification by Rutgers University.

Brian Colabella, PWS, Permitting Specialist. Brian is a Professional Wetland Scientist with over 15 years of experience. He has experience throughout the Northeast and Mid-Atlantic regions of the U.S. providing complete environmental permitting, construction compliance, and monitoring for client projects. He uses his expertise in wetland delineation to accurately identify and delineate wetlands in support of timely permitting, Project reviews, approvals. Brian's experience includes the initial Project routing, permit authorizations, and construction compliance. Brian has experience in wetland and regulated waters throughout regulatory process including final site restoration and post-construction monitoring. Technical experience includes delineation and assessment, avoidance and impact reporting, coordination of permit application submittals. Brian has a proven track record of successfully delivering multiple projects working with remote teams. Effectively manages scope, schedule, and budget to meet and exceed client expectations. Brian is certified in Winter Vegetation Identification by Rutgers University

Lora Pride, Biologist. Lora is a biologist with 24 years of professional experience that includes terrestrial and aquatic biological surveys, threatened and endangered species protection oversight, and wetland delineations for state, federal and private clients. Activities performed specific to these projects include evaluating the condition of ecological resources and species community counts, providing species identification and protection guidelines for environmental restoration projects and soil, hydrology and vegetation characterization of wetlands.

Rei-Hua Wang, Environmental Scientist. Rei-Hua is an environmental scientist/biologist with 12 year of experience in the environmental consulting field. Her technical expertise includes permitting & compliance, biological assessments, and natural resource inventory surveys for various linear rand large-scale projects throughout the Northeast Region. She has led multiple field events including wetland delineations, habitat assessments, and threatened and endangered species surveys in the Northeast, Mid-Atlantic, and Mid-Western United States. She is well versed in Federal and State regulatory processes and has prepared permits and supporting



documentation to regulatory agencies such as USACE, FERC, BOEM, NJDEP, PADEP, NYSDEC, MassDEP, ODNR, and DNREC.



APPENDIX B: Freshwater Mussel Survey Report



National Park Service

**Replace Parkwide Utility Infrastructure
CATO-250011**

**Freshwater Mussel Surveys at
Catoctin Mountain Park
Frederick County, MD**

June 24, 2021

Prepared by:

EnviroScience, Inc.

Morgantown, WV

PMIS: CATO-250011





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Acronyms and Abbreviations

Acronym	Definition
ADI	area of direct impact
CPOM	coarse particulate organic matter
DSB	downstream buffer
DSSB	downstream salvage buffer
FPOM	fine particulate organic matter
ft	foot (feet)
LWD	large woody debris
m	meter(s)
mi ²	square mile(s)
min/m ²	minute(s) per square meter
NPS	National Park Service
Protocol	2020 West Virginia Mussel Survey Protocols
SZ	salvage zone
T&E	threatened or endangered
USB	upstream buffer
WVDNR	West Virginia Division of Natural Resources

DISCLAIMER: If using a screen reader, adjustment to your default settings may be required.



Executive Summary

Freshwater Mussel Surveys

The project-specific scientific collection permit necessary to complete the three mussel surveys was received from the Maryland Department of Natural Resources Fishing and Boating Services on May 6, 2021. A copy of this permit is provided in Appendix A. The mussel survey team consisted of two federally permitted malacologists. The freshwater mussel surveys at each of the three proposed utility crossing locations were completed on May 12, 2021. Both weather and stream conditions were favorable for survey completion. Visibility from the water's surface at each proposed crossing location on the Unnamed Tributary (UNT) to Owens Creek and the UNT to Hunting Creek was clear to the bottom.

No live freshwater mussels or evidence of freshwater mussels (i.e., fresh-dead, weathered-dead, or subfossil shells) were observed within any of the three project survey areas.



Chapter 1 – Introduction

The National Park Service (NPS) has proposed three utility crossings within the Catoctin Mountain Park in Frederick County, Maryland (Figure 1). NPS plans to install a new waterline to service the Owens Creek Campground off Foxfield Deerfield Road, crossing the Unnamed Tributary (UNT) to Owens Creek (Owens Creek crossing). In addition, NPS plans to install new waterlines, fiber-optic lines, and sanitary sewer lines to service existing buildings at Camp Misty Mountain on Park Central Road (Misty Mountain crossing) and the Visitor Center near Route 77 (Visitor Center crossing), both crossing UNT to Hunting Creek (Figure 1). The drainage area on the UNT to Owens Creek upstream of the Owens Creek crossing is 2.19 square miles (mi²), while the drainage area on UNT Hunting Creek is 0.13 mi² upstream of the Misty Mountain crossing and 0.61 mi² upstream of the Visitor Center crossing. Qualitative mussel surveys were conducted at each of the three proposed crossing locations to avoid potential impacts to mussel species as a result of the project.

The following report details the methods used to complete the freshwater mussel surveys, results from survey completion, and conclusions.



Chapter 2 – Methods

2.01 *Freshwater Mussel Surveys*

Maryland does not currently have a statewide mussel survey protocol; therefore, EnviroScience, Inc. conducted the freshwater mussel surveys at each of the three project crossing locations following methods detailed within the 2020 West Virginia Mussel Survey Protocols (Protocol) for Group 1 mussel streams. The West Virginia Division of Natural Resources (WVDNR) defines Group 1 mussel streams as high-quality streams known to support populations of or habitat for freshwater mussels; however, federally listed threatened or endangered (T&E) freshwater mussel species are not expected. No T&E mussel species are known to occur in the UNT to Owens Creek or UNT to Hunting Creek. Group 1 timed search methods were conducted within each of the three crossing survey areas.

Per the Protocol, a 10 meter (m) upstream buffer (USB) and 25 m downstream buffer (DSB) were applied to each crossing area of direct impact (ADI) (Figures 2-4). The salvage zone (SZ) at each crossing location included the ADI, a 10 m downstream salvage buffer (DSSB), and a 5 m upstream salvage buffer (USSB). All survey areas were timed searched at a minimum rate of 0.2 minutes per square meter (min/m^2) in areas of heterogeneous habitat. In the event mussels were found, search times were extended for an additional 0.3 min/m^2 for a total minimum search effort of 0.5 min/m^2 . After all survey areas had been searched, adjacent stream banks and exposed substrates were searched for stranded mussels and relic shells. The substrate composition within each survey area was recorded using the Wentworth Scale (percent presence of mud, silt, sand, gravel, cobble, boulder, etc.).



Chapter 3 – Results

3.01 *Freshwater Mussel Surveys*

The freshwater mussel surveys were initiated and completed on May 12, 2021. Both weather and stream conditions were favorable for survey completion. Visibility from the water's surface at each crossing location on the UNT to Owens Creek and UNT to Hunting Creek was clear to the bottom. Digital images from the mussel surveys are provided in Appendix B.

Substrates within the Owens Creek crossing survey area consisted of a heterogeneous mixture of cobble, boulder, gravel, and sand with additional pockets of sand and silt along some areas of the stream bank, immediately downstream of large boulders, and in depositional areas of the channel. Large woody debris (LWD) and coarse particulate organic matter (CPOM) were present throughout the survey area. Depths were shallow with a maximum depth of approximately 1 foot (ft) immediately downstream of a concrete structure within the DSB.

Substrates at the Visitor Center crossing consisted of a heterogeneous mixture of cobble, boulder, gravel, and sand throughout the entire survey area (DSB, ADI, USB) with gravel and sand as dominant substrates in plunge pools (USB) and sand as a homogeneous substrate within some depositional areas along the stream bank (DSB, ADI). In addition, CPOM and fine particulate organic matter (FPOM) were abundant throughout the entire survey area. Depths were shallow with a maximum depth of approximately 1 ft below the culvert under the Park Maintenance Shop Access Road (ADI).

Substrates at the Misty Mountain crossing consisted primarily of boulder, cobble, gravel, and sand downstream of the Camp Misty Mountain Access Road (DSB, ADI) with increased sand and silt presence upstream of the Camp Misty Mountain Access Road (USB). Within the USB, hydrophytic vegetation was observed growing within the channel and within adjacent wetland areas along each side of the channel. Depths were very shallow (less than 0.5 ft) throughout the entire survey area at this crossing location.

No live freshwater mussels or evidence of freshwater mussels (i.e., fresh-dead, weathered-dead, or subfossil shells) were detected within any of the three project survey areas.



Chapter 4 – Conclusions

4.01 Freshwater Mussel Surveys

No live freshwater mussels or evidence of freshwater mussels were detected within any crossing location survey area. Based on the results of the project qualitative mussel surveys, the proposed instream activities for the three utility crossings will not have adverse effects on native freshwater mussels in Frederick County, Maryland.



Chapter 5 – Literature Cited

West Virginia Division of Natural Resources, Wildlife Resources Section. 2020. West Virginia Mussel Survey Protocols. Elkins Operation Center. Elkins, West Virginia 26241. March.



Figures

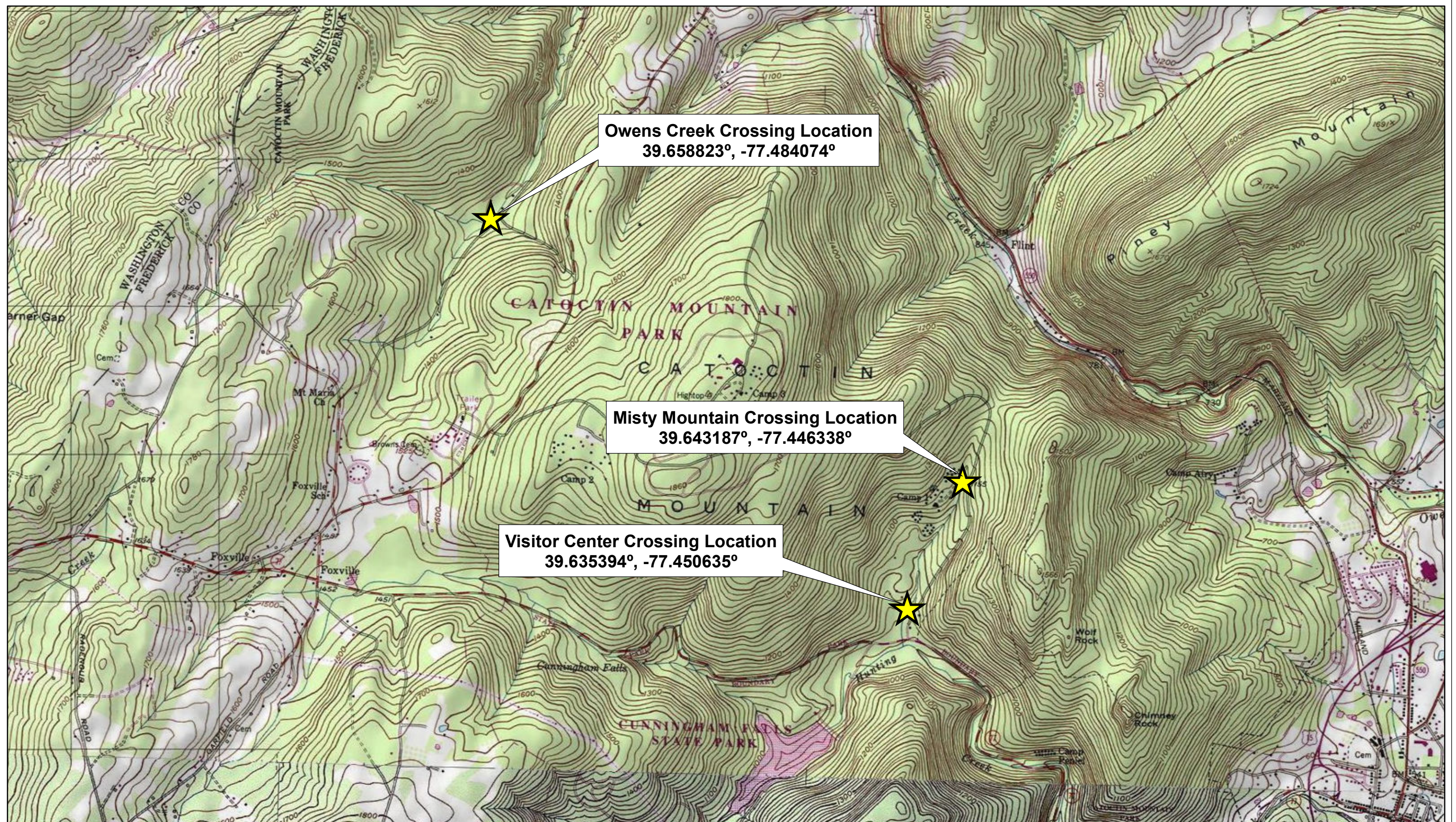
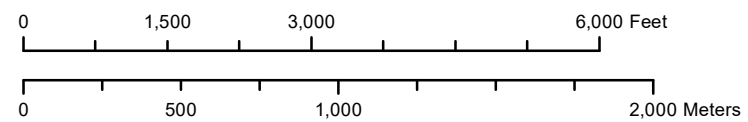


Figure 1. Catoclin Mountain Park
Proposed Utility Crossing Locations Map
UNT Owens and Hunting Creeks
Frederick County, Maryland



Utility Crossing Locations



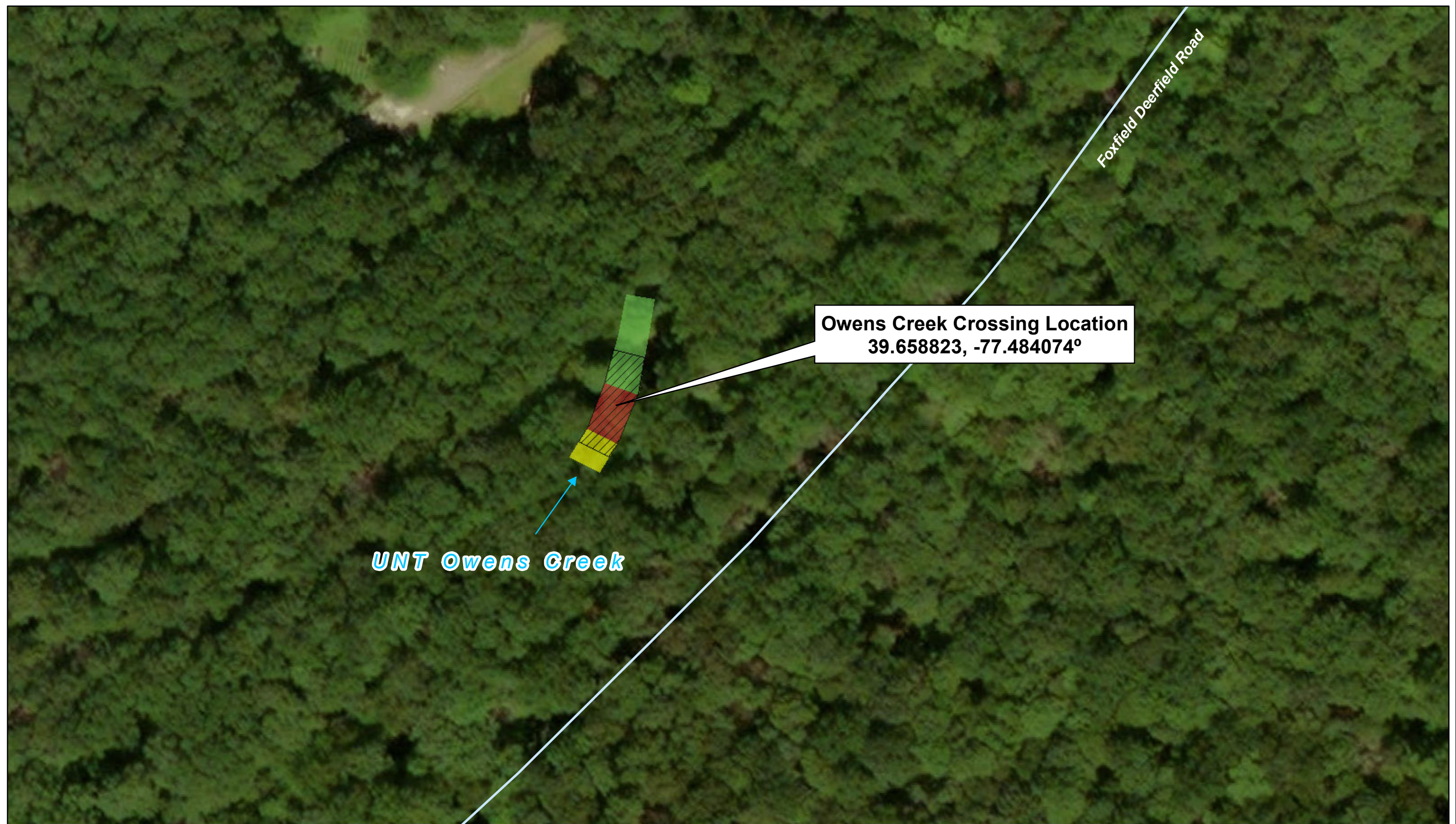


Figure 2. Owens Creek Campground Utility
Project Mussel Survey Design Map
Frederick County, Maryland

- Area of Direct Impact
- Downstream Buffer
- Upstream Buffer
- Salvage Zones

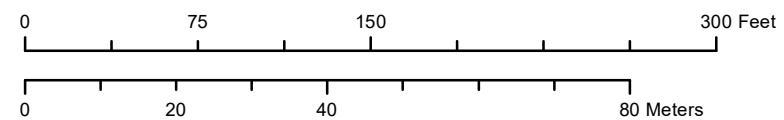




Figure 3. Visitor Center Utility
Project Mussel Survey Design Map
Frederick County, Maryland

- Area of Direct Impact
- Downstream Buffer
- Upstream Buffer
- Salvage Zone

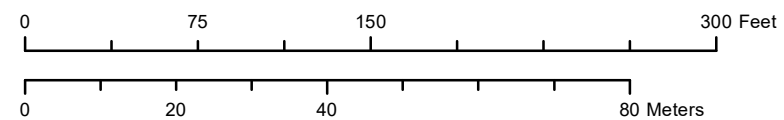
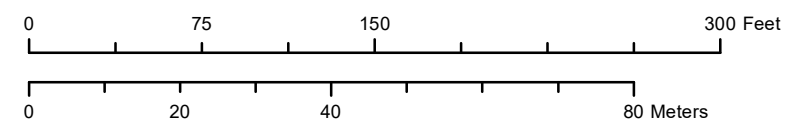




Figure 4. Camp Misty Mountain Utility
Project Mussel Survey Design Map
Frederick County, Maryland

- Area of Direct Impact
- Downstream Buffer
- Upstream Buffer
- Salvage Zone





Tables

Table 1. Percent Substrate Composition by Survey Area for each Crossing Location

Substrate Types (%)	Owens Creek Crossing					
	Survey Area	DSB	DSSB	ADI	USSB	USB
	Silt	0	5	5	0	0
	Sand	10	10	20	15	15
	Gravel	20	25	25	25	25
	Cobble	30	40	40	50	50
	Boulder	20	10	5	0	0
	Wood	10	5	5	10	5
	Dry	10	5	0	0	5
	Total	100	100	100	100	100
Substrate Types (%)	Visitor Center Crossing					
	Survey Area	DSB	DSSB	ADI	USSB	USB
	Silt	0	0	0	0	0
	Sand	20	25	25	25	30
	Gravel	35	35	35	35	40
	Cobble	25	30	30	30	20
	Boulder	10	10	10	10	10
	Wood	10	0	0	0	0
	Dry	0	0	0	0	0
	Total	100	100	100	100	100
Substrate Types (%)	Misty Mountain Crossing					
	Survey Area	DSB	DSSB	ADI	USSB	USB
	Silt	5	0	5	20	20
	Sand	10	15	15	35	35
	Gravel	35	40	30	20	20
	Cobble	30	25	35	15	15
	Boulder	15	20	15	0	0
	Wood	5	0	0	10	10
	Dry	0	0	0	0	0
	Total	100	100	100	100	100




Appendix A – Maryland Department of Natural Resources Scientific Collection Permit and Project-Specific Approval



MARYLAND DEPARTMENT OF NATURAL RESOURCES

FISHING & BOATING SERVICES

SCIENTIFIC COLLECTION PERMIT

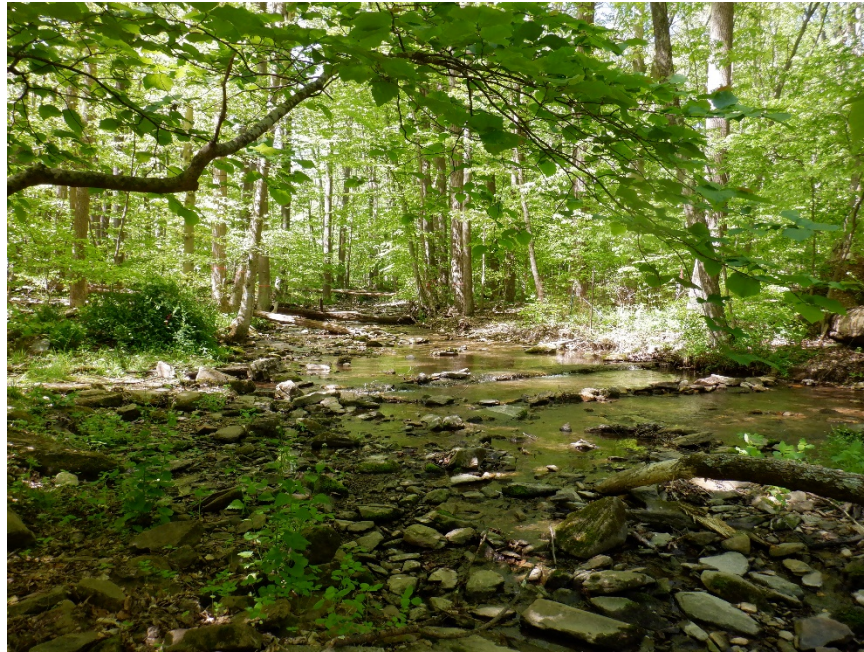
1. PERMITTEE ENVIROSCIENCE 129 GREENBAG ROAD MORGANTOWN, WV 26501	2. PERMIT NUMBER SCP202163	
	3. EFFECTIVE 5-6-21	4. EXPIRES 12-31-2021
	5. PHONE 3042824292 (WORK) E-MAIL bcarlson@enviromscienceinc.com	
6. NAME AND TITLE OF PRINCIPAL OFFICER BRIAN CARLSON		
7. CONDITIONS AND AUTHORIZATIONS: A. AUTHORITY FOR THIS PERMIT IS UNDER THE ANNOTATED CODE OF MARYLAND §4-212. THE CONDITIONS IN STATE LAW AND REGULATIONS ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS, AND CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, FEDERAL, LOCAL OR OTHER STATE LAWS. B. YOU MUST REPORT THE COLLECTION OF ANY MARKED FISH AND SHELLFISH TO THE APPROPRIATE AGENCY. MARKINGS MAY INCLUDE FIN CLIPS, STREAMER OR FLOY TAGS, ETC. C. YOU MUST CONTACT THE DEPARTMENT OF NATURAL RESOURCES POLICE AT 410-260-8940 TO LET THEM KNOW WHEN YOU WILL BE OPERATING IN MARYLAND WATERS. THIS ELIMINATES UNNECESSARY POLICE INVESTIGATIONS. D. THIS PERMIT DOES NOT AUTHORIZE THE COLLECTION, SALVAGE, POSSESSION OR TRANSPORTATION OF ANY SPECIES CLASSIFIED AS PROHIBITED, THREATENED OR ENDANGERED AT THE STATE OR FEDERAL LEVEL (EXCEPT AS LISTED BELOW). E. STUDY DESCRIPTION: FRESHWATER MUSSEL SURVEY: MUSSEL SAMPLES MAY BE COLLECTED AT EACH SURVEY AREA ACCORDING TO 2020 WEST VIRGINIA MUSSEL SURVEY PROTOCOLS FOR GROUP 1 STREAMS. RELOCATION SURVEY MAY BE CONDUCTED ACCORDING TO THE 2020 WEST VIRGINIA MUSSEL SURVEY PROTOCOLS FOR GROUP 1 MUSSEL STREAMS. ALL LIVE MUSSELS MAY BE COLLECTED WITHIN A SALVAGE ZONE AND MAY BE MOVED TO A DETERMINED RELOCATION AREA UPSTREAM OF THE RESPECTIVE CROSSING LOCATION. ALL OBSERVATIONS OF RESIDENT MUSSELS SHALL BE REPORTED INCLUDING SITE COORDINATES IN DECIMAL DEGREES. MUSSELS SHALL BE HAND-PLACED INTO SUBSTRATE WITHIN THE RELOCATION AREA. F. SAMPLING LOCATIONS: (GEAR: VIEWBUCKETS AND/OR SNORKELING EQUIPMENT) PROPOSED UTILITY CROSSINGS SITES AT UNT HUNTING CREEK, UNT OWENS CREEK, AND OWENS CREEK IN CATOCTIN MOUNTAIN PARK IN FREDERICK COUNTY, MARYLAND. G. RELEASE ANY FISH CAPTURED, ALIVE. APPROPRIATE DECONTAMINATION OF WADERS AND GEAR SHOULD BE PRACTICED BETWEEN STREAM COLLECTIONS. H. SAMPLING OF FRESHWATER MUSSELS IS PERMITTED ACCORDING TO SECTIONS 7A-G (SEE ABOVE) FOR THE PURPOSE OF ASSESSMENTS IN FREDERICK COUNTY. I. SPECIES COLLECTED AND/OR HELD UNDER THIS PERMIT ARE NOT PERMITTED FOR PERSONAL CONSUMPTION OR SALE.		
8. LIST OF COLLECTORS IN ADDITION TO THE PRINCIPAL OFFICER (at least one collector on site must be carrying a copy of this permit): SARAH VESELKA		
9. REPORTING REQUIREMENTS: SUMMARY REPORT OF PERMIT ACTIVITY DUE BY JANUARY 31, 2022		
ISSUED BY  ACTING PERMIT COORDINATOR 410-260-8266		EXPIRES 12-31-2021



Appendix B – Photo Log



***Digital Image 1. View upstream of the DSB and ADI at the Owens Creek crossing location.
(Approximate Location: 39.659021°, -77.484008°)***



Digital Image 2. View downstream of the lower DSB at the Owens Creek crossing location. (Approximate Location: 39.659021°, -77.484008°)





***Digital Image 3. View upstream of the ADI at the Owens Creek crossing location. |
(Approximate Location: 39.658868°, -77.484046°)***



Digital Image 4. View downstream of the DSB at the Owens Creek crossing location. (Approximate Location: 39.658868°, -77.484046°)





***Digital Image 5. View upstream of the USB at the Owens Creek crossing location.
(Approximate location: 39.658722°, -77.484194°)***



Digital Image 6. View downstream of the USB and upper ADI at the Owens Creek crossing location. (Approximate location: 39.658722°, -77.484194°)





Digital Image 7. View of heterogeneous substrates found throughout the Owens Creek crossing location. (Approximate location: 39.658852°, -77.484060°)



Digital Image 8. View upstream of the USB at the Visitor Center crossing location. (Approximate location: 39.635140°, -77.450891°)

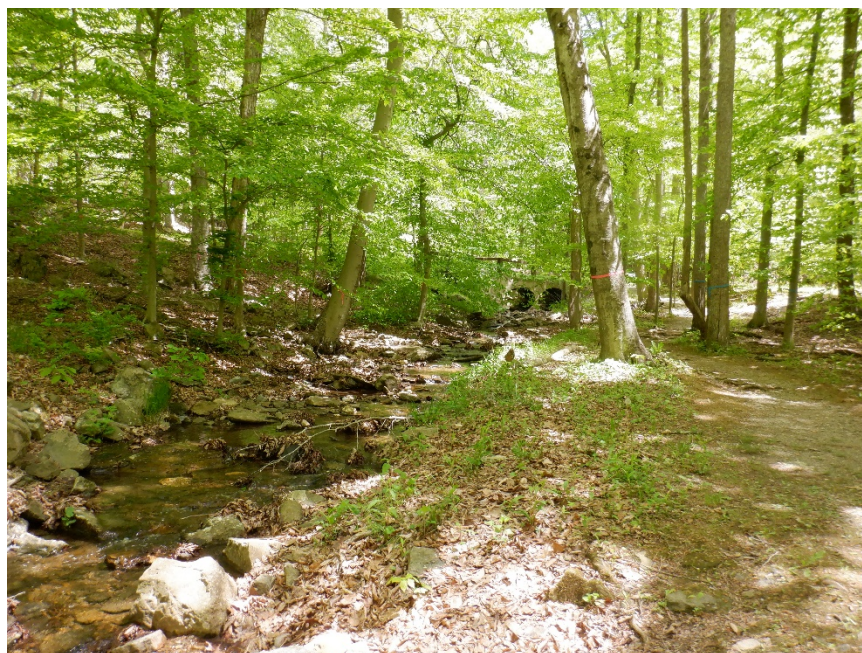




***Digital Image 9. View downstream from the USB at the Visitor Center crossing location.
(Approximate location: 39.635140°, -77.450891°)***



Digital Image 10. View upstream of the ADI and USB at the Visitor Center crossing location. (Approximate location: 39.635351°, -77.450589°)





***Digital Image 11. View downstream of the DSB at the Visitor Center crossing location.
(Approximate location: 39.635351°, -77.450589°)***



Digital Image 12. View upstream of survey efforts within the USB at the Visitor Center crossing location. (Approximate location: 39.635466°, -77.450310°)





Digital Image 13. View downstream of the lower USB and ADI at the Visitor Center crossing location. (Approximate location: 39.635466°, -77.450310°)

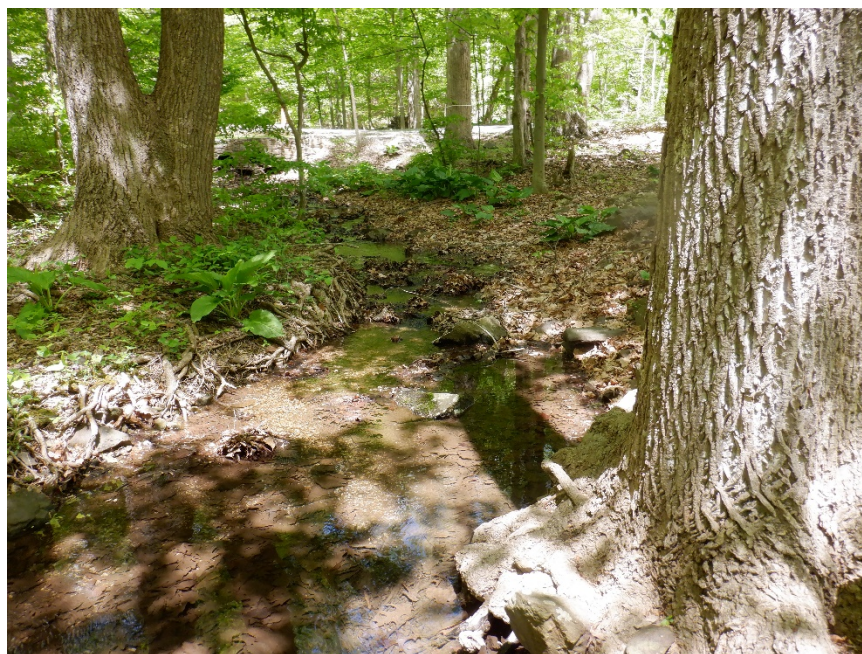


Digital Image 14. View of heterogeneous substrates found throughout the Visitor Center crossing location. (Approximate location: 39.635375°, -77.450500°)





***Digital Image 15. View upstream of the DSB at the Misty Mountain crossing location.
(Approximate location: 39.642940°, -77.446328°)***



***Digital Image 16. View downstream of the DSB at the Misty Mountain crossing location.
(Approximate location: 39.642940°, -77.446328°)***





***Digital Image 17. View upstream of the ADI at the Misty Mountain crossing location.
(Approximate location: 39.643109°, -77.446387°)***



Digital Image 18. View downstream from the lower ADI at the Misty Mountain crossing location. (Approximate location: 39.643109°, -77.446387°)





***Digital Image 19. View upstream of the USB at the Misty Mountain crossing location.
(Approximate location: 39.643267°, -77.446453°)***



Digital Image 20. View downstream of the upper ADI and lower USB at the Misty Mountain crossing location. (Approximate location: 39.643267°, -77.446453°)





Digital Image 21. View of substrates at the Misty Mountain crossing location downstream of the access road. (Approximate location: 39.642990°, -77.446358°)



Digital Image 22. View of substrates at the Misty Mountain crossing location upstream of the access road. (Approximate location: 39.643267°, -77.446453°)





APPENDIX C: U.S. Fish and Wildlife Service Consultation



IN REPLY REFER TO

United States Department of the Interior

NATIONAL PARK SERVICE

CATOCTIN MOUNTAIN PARK
6602 Foxville Road
Thurmont, MD 21788



CATO-250011 Replace Parkwide Utility Infrastructure

March 12, 2021

Ms. Cherry Keller
Endangered Species Program Leader
U.S. Fish and Wildlife Service
Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, Maryland 21401

Subject: Section 7 Endangered Species Act Consultation; CATO-250011 Replace Parkwide Utility Infrastructure, Catoctin Mountain Park, Frederick County, Maryland. Consultation Code: 05E2CB00-2021-SLI-0619 Event Code: 05E2CB00-2021-E-01518

Dear Ms. Keller:

This letter initiates informal consultation with the US Fish and Wildlife Service under Section 7 of the Endangered Species Act in reference to the Replace Parkwide Utility Infrastructure at Catoctin Mountain Park, Frederick County, Maryland.

Project Description

The National Park Service (NPS) is proposing to replace Park-owned and operated infrastructure systems including potable water, sanitary sewer, electric power, and communications with new systems that meet local, state, and national operational standards (the Project). The Project is located at the Catoctin Mountain Park in Thurmont, Frederick County, Maryland. The Park was established in the 1930s making the existing infrastructure range in age from 25 to 80 years old. The aging infrastructure has caused drinking water compliance issues documented in a NPS Public Health Program memorandum titled Drinking Water Testing Results. This Project will correct infrastructure deficiencies that directly affect the natural environment, Park personnel, and visitors.

Under the current design, the NPS will replace and/or repair infrastructure within a Project Area measuring approximately 16.5 acres including approximately 6.5 miles of utility trenching. Specifically, the project design includes the following:

- Consolidation of the water distribution system into a centralized location near Camp Greentop for Camp Greentop, Camp Round Meadow, and Camp Misty Mount.
- Owens Creek Campground will be maintained as a stand-alone system supplied by the rehabilitation of the existing Ike Smith Well House.
- Jim Brown and Poplar Grove wells (4 total) will be rehabilitated and will supply raw water to a common chemical treatment location and water storage tank.

TAKE PRIDE
IN AMERICA 

- Primary water mains will be replaced for Camp Misty Mount and Camp Round Meadow.
- Primary sewer mains will be replaced at Camp Misty Mount, Camp Round Meadow, and Camp Greentop.
- Rehabilitation of the Camp Greentop sanitary sewer lift station and replacement of the lift station at Camp Round Meadow.
- Primary site electrical replacement for Camp Misty Mount, Camp Round Meadow, and Camp Greentop.
- Communication upgrade between Post 5A and Camp Greentop Office (Building 56).
- Water and sanitary sewer meter installations within the campgrounds.
- Safely decommission and partial demolition of the existing Camp Misty Mount and Camp Round Meadow water tanks (3 total).
- Secondary water service laterals replacement for Camp Misty Mount and Camp Round Meadow.
- Secondary sanitary sewer laterals replacement for Camp Misty Mount, Camp Greentop, and Camp Round Meadow.
- Fiber-optic backbone from Camp Round Meadow Gym to the new Centralized Treatment Building, and from the Centralized Treatment Building to Park East side through Park Central Road.
- Primary water main replacement from Ike Smith Well House to Owens Creek Campground.
- Water service laterals from Owens Creek Campground water main to the two comfort stations.

Affected Area

The wooded area consists of well developed, mature mostly even aged tree canopy, a moderate layer of native and invasive shrubs at the understory and a sparse herbaceous layer along the fringes of these previously disturbed utility corridors. Three wooded camp areas, including two historic cabin camps, will also be included in the project area.

Approximately 2094 trees will be removed to provide the appropriate area necessary for the construction corridor along the utility alignments. The total area of these trees will be less than 15 acres. Species composition along the utility corridors include Northern red oak (*Quercus rubra*), Shagbark hickory (*Carya ovata*), White oak (*Quercus alba*), Tulip poplar (*Liriodendron tulipifera*) Red maple (*Acer rubrum*). Native components of the understory are often young Black gum (*Nyssa sylvatica*), Sasafras (*Sasafras albidum*) and White ash (*Fraxinus americana*) trees and Northern Spicebush (*Lindera benzoin*) shrubs.

The affected area of the proposed action was reviewed for potential/suitable habitat for federally listed Threatened and Endangered species. A species list was obtained from the IPaC System (<https://ecos.fws.gov/ipac/>). Table 1 lists those species that could potentially occur in the action area in Catoctin Mountain Park. A brief description of their status and preferred habitat is included in Table 1. No critical habitat has been designated within the park or this project area.

The majority of these effects will be temporary and generated solely during construction. It is difficult to predict the degree to which Indiana and NLEBs would be disturbed by the noise and vibrations associated with construction activities but it is reasonable to assume that any effect resulting from noise and vibrations could result in bats selecting roost trees or foraging areas further from the disturbance. However, there would be limited exposure of foraging Indiana bats and NLEBs to construction-related noise and vibration since most construction work occurs during the daytime.

Species and Critical Habitat Effects Determination

The NPS has determined that actions associated with the outlined project could affect listed species in the following manner:

- Northern long-eared bat: The project "May Affect," but is not likely to adversely affect the Northern long-eared bat.
- Indiana bat: The project "May Affect," but is not likely to adversely affect the Indiana bat.

I therefore request your written concurrence or other guidance pursuant to meeting Section 7 consultation requirements and/or recommendations for improving protection of listed species that may occur within the proposed action area.

I look forward to your response and thank you in advance for your review. Should you have any questions regarding measures to protect federally listed or candidate species, please contact Becky Loncosky, Biologist at Becky_Loncosky@nps.gov.

Sincerely,



Rebecca Loncosky
Biologist

Enclosure

Post-White-nose Syndrome Assessment of Bat Species Occupancy at Catoclin Mountain Park and Harper's Ferry National Historical Park – Interim Report W Mark Ford, USGS

20210208_CATO-250011_USFWSSpecies List

Table 1 Threatened and Endangered Species with Potential Habitat in the action area.

Scientific Name	Common Name	Federal Status	Habitat Summary
<i>Myotis septentrionalis</i>	Northern long-eared bat	Threatened	Winter hibernacula in caves and mines; in summer, underneath bark, cavities, or crevices of both live trees and snags. Roosts and forages in upland forests during late spring and summer.
<i>Myotis sodalis</i>	Indiana bat	Endangered	Winter hibernacula in caves and mines; in summer, wooded photo areas near streams, roosting in crevices under tree bark or in hollow trees.

Species/Critical Habitat within the Affected Area

The Indiana bat (*Myotis sodalis*), and Northern long-eared bat (*Myotis septentrionalis*) have the potential to occur in or near the site and will be discussed in more detail below. Critical habitat has not been identified for either of these species in Catoctin Mountain Park.

Indiana bat and Northern long-eared bat (NLEB) have been recorded during acoustic surveys in Catoctin Mountain Park (Attachment) (Post-White-nose Syndrome Assessment of Bat Species Occupancy at Catoctin Mountain Park and Harper's Ferry National Historical Park – Interim Report, M Ford 2017). No known nursery trees or hibernacula have been identified within the Park. Much of western and central Maryland is counted as being within the potential range of the Indiana bat and all of Maryland for the NLEB (USFWS). If present, these bat species are likely rare, and the likelihood of their presence in the immediate vicinity of the project area is low. Further studies of these bat species are planned for 2023.

There are no known hibernacula or maternity roost trees in the park or the vicinity of the utility project area. Although there are no records of NLEB roost or foraging habitat from the action area; NPS activities could potentially remove some roost trees during construction of the utility project. In addition, increased disturbance may occur during clearing and construction from the use of equipment and may be exposed to noise levels and vibrations that they may not have experience depending on the proximity of their roost sites or foraging areas to these construction activities. Tree removal will be conducted between August 1 and May 31. No tree removal will occur during the bat pup rearing season (June 1-July 31).



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, Maryland 21401
<http://www.fws.gov/chesapeakebay>



April 14, 2021

Rebecca Loncosky
National Park Service
Catoctin Mountain Park
6602 Foxville Road
Thurmont, MD 21788

Re: "Not Likely to Adversely Affect" determinations for the Indiana bat and northern long-eared bat for CATO-250011; Replace Parkwide Utility Infrastructure at Catoctin Mountain Park in Thurmont in Frederick County, Maryland

Dear Ms. Loncosky:

The U.S. Fish and Wildlife Service (Service) has reviewed your project information from the Service's Information for Planning and Consultation (IPaC) online system dated February 8, 2021, your letter dated March 12, 2021, the 2015 Post-White-nose Syndrome Assessment of Bat Species Occupancy at Catoctin Mountain Park and Harper's Ferry National Historical Park – Interim Report, and all of your email messages. The Service has evaluated the potential effects of this project to the federally endangered Indiana bat (*Myotis sodalis*) and federally threatened northern long-eared bat (*Myotis septentrionalis*). The comments provided below are in accordance with Section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

The purpose of this proposed project is to replace Park-owned and operated infrastructure systems (including potable water, sanitary sewer, electric power, and communications) with new systems that meet local, state, and national operational standards. The Catoctin Mountain Park was established in the 1930s making the existing infrastructure range in age from 25 to 80 years old. The aging infrastructure has caused drinking water compliance issues documented in a National Park Service Public Health Program memorandum, titled "Drinking Water Testing Results." This Project will correct infrastructure deficiencies that directly affect the natural environment, Park personnel, and visitors.

According to the 2015 bat survey report, the Indiana bat was detected at 10 Catoctin Mountain Park acoustic sites and the northern long-eared bat was detected at 9 Catoctin Mountain Park acoustic sites.

While the federally endangered Indiana bat and federally threatened northern long-eared bat are known to occur in the project vicinity, this project as proposed is "not likely to adversely affect"

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the Indiana bat and northern long-eared bat because tree-clearing will occur from September 1 through April 30, which is a time period when both species are hibernating in caves and not using forested habitat.

No other federally proposed or listed endangered or threatened species will be affected by this proposed project. Should project plans change, or if additional information on the distribution of listed or proposed species becomes available, this determination may be reconsidered.

We appreciate the opportunity to provide information relevant to threatened and endangered fish and wildlife resources. This Endangered Species Act determination does not exempt this project from obtaining all permits and approvals that may be required by other state or Federal agencies. If you have any questions or concerns regarding this letter, please contact Trevor Clark of my Endangered Species staff at (410) 573-4527 or by email at trevor_clark@fws.gov.

Sincerely,

GENEVIEVE
E PULLIS

Digitally signed by
GENEVIEVE PULLIS
Date: 2021.04.14
08:44:05 -04'00'

Genevieve LaRouche
Field Supervisor



APPENDIX D: Section 106 Consultation



United States Department of the Interior

NATIONAL PARK SERVICE

CATOCTIN MOUNTAIN PARK
6602 Foxville Road
Thurmont, MD 21788



IN REPLY REFER TO:

CATO-1.A.2 COMPLIANCE

August 9, 2021

Elizabeth Hughes
State Historic Preservation Officer
Attn: Beth Cole, Administrator, Project Review and Compliance
Maryland Historical Trust
100 Community Place, 3rd Floor
Crownsville, MD 21032

Subject: **Catoctin Mountain Park: Replace Parkwide Utility Infrastructure
Thurmont, Frederick County, Maryland
Section 106 Review
NPS PEPC 88406**

Dear Ms. Hughes:

In accordance with Section 106 of the National Historic Preservation Act (NHPA), as amended, and the *Programmatic Agreement Among the National Park Service, Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers for Compliance with Section 106 of the National Historic Preservation Act*, Catoctin Mountain Park respectfully submits the following for your review.

In a letter dated December 18, 2020, we presented a proposal to replace and improve park-wide utility systems, including potable water, sanitary sewer, electrical power, and communications. Since our initial consultation package, we have prepared the enclosed assessment of actions having an effect on historic properties and associated materials.

Secretary of the Interior-Qualified cultural resources subject-matter experts (SME) on staff at the National Park Service (NPS) National Capital Area Office (NCA), Resource Stewardship & Science-Cultural Resources, and Catoctin Mountain Park (Park), Resources Division, have reviewed the proposed project and recommend that this project will have **no adverse effect** on historic properties. SME comments and recommendations include:

NCA Archeologist A: Review of the Phase I Archeological Survey Report was completed. The survey intensively investigated the APE for ground disturbing activities for adverse effects to archeological resources. The report concluded that no significant archeological resources would be impacted as a result of the proposed utility upgrades. No additional work was recommended. I concur with this determination.

NCA Archeologist B: No NRHP eligible archeological resources will be affected by this undertaking

NCA Historical Architect: A standing seam aluminum roof on the Centralized Treatment Building will have No Adverse Effect. The proposed location for fiber optic at the Round Meadow Gym will have No Adverse Effect. The proposed revised location for fiber optic at the Visitor Center will have No Adverse Effect. The Ike Smith Booster House and Blue Blazes Well House are to be abandoned in place. These will present a long-term concern for the park, as it will be difficult to justify maintenance for buildings that are not critical to the mission of the park. At a near future date, the park should plan for alternative uses for these buildings to



ensure their long-term viability.

Park Architectural Historian: Throughout the design process, SMEs have worked very closely with project managers to identify and mitigate effects to historic resources. For example, the rehabilitation of the Jim Brown Wellhouse, which is managed by the park as contributing to the district, will be restored to its appearance during the period of significance. The removal of approximately 962 trees within the character-defining forested park landscape was carefully planned in consultation with the Regional Historic Landscape Architect to avoid significant visual gaps in the character-defining forested park landscape and a planting plan for native shrubs was prepared to mitigate open spaces in cabin camp areas and near the new treatment facility. Overall, this project will have no adverse effect on historic resources.

To support your review, we are enclosing the updated Basis of Design; Design Drawings; maps; photographs; two NPS Planning, Environment, and Public Comment (PEPC) forms; the Final Phase I Archeological Survey Report, which incorporates comments submitted by your office on February 2, 2021, the Addendum Phase I Archeological Investigations Management Summary, and the Draft Addendum Phase I Archeological Investigations Report.

We respectfully request your concurrence that the proposed project to replace parkwide utility infrastructure will have **no adverse effect** on historic properties. If you have questions or concerns about this project, please do not hesitate to contact Katie Wackrow, Cultural Resources Program Manager, Catoctin Mountain Park, by phone at (229) 815-0051 or by email at kathleen_wackrow@nps.gov.

Sincerely,

**RICHARD
SLADE**

Digitally signed by RICHARD
SLADE
Date: 2021.08.09 13:44:53
-04'00'

Rick Slade
Superintendent
Catoctin Mountain Park

Enclosures: Design Documents; NPS PEPC Forms; Maps; Photographs; Archeological Survey Reports
Cc: Cultural Resources Program Manager, Catoctin Mountain Park



ASSESSMENT OF ACTIONS HAVING AN EFFECT ON HISTORIC PROPERTIES

A. DESCRIPTION OF UNDERTAKING

1. Park: Catoctin Mountain Park

2. Project Description:

Project Name: Replace Parkwide Utility Infrastructure

Prepared by: Kathleen Wackrow **Date Prepared:** 05/24/2021 **Telephone:** 229-815-0051

PEPC Project Number: 88406

Locations:

County, State: Washington, MD

County, State: Frederick, MD

Describe project:

The National Park Service proposes to replace and improve all primary and portions of secondary utility systems under jurisdiction of Catoctin Mountain Park. Utility systems associated with this project include potable water, sanitary sewer, electrical power, and communications. This project is intended to replace rapidly deteriorating, existing infrastructure that range in age from 20 to 80 years with new systems that meet up-to-date local, state, and national operational standards. At present, these outdated utilities are significantly impacting the natural environment, and visitor and employee health and safety.

It will replace an outdated potable water treatment and distribution system, including rehabilitation of fire hydrants. The communication network will be significantly upgraded, eliminating redundant systems and linking offices Parkwide. Additionally, the integrated communication technology will allow facilities management professionals to monitor real-time water flow, treatment, storage, and distribution systems and will replace unreliable/non-functional, cell-based telemetry.

The proposed project encompasses:

- The construction of a new centralized treatment building and water tank between Camp David and Park Central Road, located approximately 500 feet from the existing water storage tank that services Camp Greentop, to service Camp Greentop, Camp Round Meadow, and Camp Misty Mount.
- The decommission and/or demolition of five water tanks that currently service Camp Misty Mount, Camp Greentop, and Camp Round Meadow, which are all buried beneath mounds of dirt.
- The rehabilitation of four wells located within the Jim Brown and Poplar Grove areas to supply raw water to the new centralized treatment building and water storage tank.
- The rehabilitation of three buildings, Jim Brown Well House No. 1, Poplar Grove Well House No. 1, and Ike Smith Well House. The well houses at Jim Brown and Poplar Grove will be rehabilitated in association with the new centralized treatment building and water storage tank, while the Ike Smith Well House will be rehabilitated to service the stand-alone system at Owens Creek Campground. Jim Brown Well House No. 1 is managed by the NPS as contributing to the Catoctin Mountain Park Historic District and will be rehabilitated in accordance with The Secretary of the Interior's Standards for Rehabilitation.
- The replacement of existing underground primary water mains associated with Camp Misty Mount and Camp Round Meadow.
- The replacement of existing underground primary sewer mains associated with Camp Misty Mount, Camp Round Meadow, and Camp Greentop.

- The rehabilitation of the Camp Greentop lift station and the replacement of the Camp Round Meadow lift station.
- The replacement of the existing primary site electrical, including transformer replacement, associated with Camp Misty Mount, Camp Round Meadow, and Camp Greentop.
- The installation of a new fiber-optic backbone between the new centralized treatment building, the Camp Round Meadow Gym, and the Catoctin Mountain Park Visitor Center, with hardwire nodes to connect the various treatment facilities (well houses, lift station, centralized treatment building, and water storage tank).
- The abandonment-in-place of the Ike Smith Booster Station, Blue Blazes Well House No. 1, and Blue Blazes Well House No. 2. In the 2014 National Register Nomination for Catoctin Mountain Park, the Ike Smith Booster Station is listed as a contributing building to the historic district. The NPS manages the Blue Blazes Well House No. 1 as contributing to the historic district. Both buildings will be temporarily mothballed in accordance with NPS Preservation Brief #31 until the park evaluates the future use of the building.
- The trenching of utility corridors, totaling approximately 6.5 miles long, in association with the replacement of existing or installation of new underground utility lines.
- The rehabilitation, replacement, or installation of approximately 72 additional utility structures in association with proposed work within utility corridors. Related utility structures include sanitary sewer manholes, air valves, water meters, sewer meters, electrical meters, fire hydrants, fiber-optic splice boxes, pressure relief valves, and staging areas.
- The removal of approximately 962 trees that are (1) directly impacted by the proposed project or (2) trees that will not have a sufficient critical root zone and therefore the impact would be detrimental to the tree species. Tree removal designs were prepared in close consultation with a qualified NPS Historic Landscape Architect to limit visual impacts to cultural landscapes and historic districts.
- The use of existing parking areas near segments of the project as staging areas.

For a narrative of project details and associated drawings, please refer to the attached documents entitled "Basis of Design Report" and "Design Development Drawings." For detailed information on the Archeological Investigations associated with this project, please refer to the documents entitled "Phase I Archeological Survey" (2020) and "Addendum Phase I Archeological Survey" (2021).

This project will occur within the boundaries of three properties identified as both cultural landscapes and districts listed on the National Register of Historic Places: Catoctin Mountain Park Historic District, Camp Greentop Historic District, and Camp Misty Mount Historic District.

Area of potential effects (as defined in 36 CFR 800.16[d])

The Area of Potential Effect contains all ground disturbing activities and expands to encompass contributing resources that are directly or indirectly affected by the proposed project (see attached).

3. Has the area of potential effects been surveyed to identify historic properties?

☐ No
☒ Yes

Source or reference: National Register Multiple Property Documentation Form: ECW Architecture (1989)

Archeological Survey: People of the Mountain Archeological Overview Study - Louis Berger, Inc. (2013)

Cultural Landscape Inventory: Catoctin Mountain Park (2002)

Archeological Survey - Catoctin Mountain Park Cultural Resource Survey - Colby (1992)

Determination of Eligibility: Ike Smith Pumphouse (2002)

Phase I Archeological Survey Management Summary (2020)

Phase I Archeological Survey (2020)

National Register Nomination: Catoctin Mountain Park - MIHP #F-6-147 (04/09/2014)

National Register Nomination: Camp Greentop Historic District (1989)

National Register Nomination: Camp Misty Mount (1989)

Cultural Landscape Inventory: Camp Misty Mount (2006)

Cultural Landscape Inventory: Camp Greentop (2015)

4. Potentially Affected Resource(s):

Archeological Resources Present: Yes

Archeological Resources Notes: This project involves ground-disturbing activities in association with the installation and replacement of utilities. For a full description of these ground-disturbing activities, please refer to the attached archeological reports. The Phase I field reconnaissance completed by SOI Qualified Archeologists was conducted in October and December of 2020 and in July 2021. The survey area consisted of a 10.5-kilometer (6.5-mile) long utility corridor; a 6.1 by 6.1-meter (20' x 20') radius for all manhole, air vent, geotechnical drilling, and subsurface evaluation hole locations; and a 12.2 by 12.2-meter (40' x 40') radius for any proposed lift stations. The archeologists who completed the survey recommend that previously identified sites within the Project Area or within 30.5 meters (100') of the Project do not meet eligibility criteria for listing in the NRHP. Overall, the SOI qualified archeologists recommend that no additional archaeological work is necessary for the Project. Please refer to the attached archeological reports for more information.

Historical Structures/Resources Present: Yes

Property Name: Ike Smith Pump house (Building 62) **LCS:** 231878 **ParkID:** PG-062 **Asset:** 90725
Location: off gravel section Manahan Road (17390)

Property Name: Blue Blazes Well House No. 1 **LCS:** **ParkID:** 168

Property Name: Jim Brown Well House **LCS:** **ParkID:** 174

Property Name: Catoctin Mountain Park Historic District **LCS:**

Property Name: Catoctin Mountain Park Visitor Center **LCS:**

Property Name: Gymnasium **LCS:**

Historical Structures/Resources Notes: This project occurs within the boundaries of a National Register-listed historic district, Catoctin Mountain Park. Its nomination was accepted by the Keeper on June 24, 2014. The district is eligible under Criteria A, B, C, and D in the areas of Architecture, Archeology, Recreation, Industry, and Military. Its period of significance runs from 3,000 BCE to 1954 CE. For those resources specific to Camp David, it has a second period of significance which runs from 1952 to 1978. Park resources associated with Mission 66 and Job Corps were not evaluated for National Register eligibility. In 2022, the park will update the existing nomination to evaluate these related resources. Until the nomination is complete, the NPS will manage resources associated with the Job Corps and Mission 66 as contributing. This project directly effects five historic buildings, including the Ike Smith Pumphouse (1938), which was constructed by the Catoctin RDA as a pumphouse and is identified in the nomination as contributing. Blue Blazes Well House No. 1 (1966), Jim Brown Well House No. 1 (1965), and the Gymnasium at Camp Round Meadow (1968-1968) were constructed by the Job Corps and are managed by the NPS as contributing. Catoctin Mountain Park Visitor Center (1941) was constructed by the RDA, with NPS improvements in 1965 and 1990, and is managed by the NPS as contributing. The remainder of historic resources within the district are indirectly affected by the project with temporary visual effects, such as trenching, and minor visual effects, such as the in-kind replacement of aboveground utility structures like fire hydrants. In certain locations, the project area appears to intersect contributing features, such as the Saw Mill Race in the Owen's Creek Campground Area and the Stone Wall and Headwalls near the Visitor Center. In both instances, underground utilities will be replaced via pipe-splitting methods to avoid adverse effects to historic resources.

Cultural Landscapes Present: Yes

Property Name: Camp Greentop Cultural Landscape **LCS:**

Property Name: Catoctin Mountain Park Cultural Landscape **LCS:**

Property Name: Camp Misty Mount Cultural Landscape **LCS:**

Cultural Landscapes Notes: This project will occur within the boundaries of a parent cultural landscape, Catoctin Mountain Park, and two component cultural landscapes, Camp Greentop and Camp Misty Mount. The State Historic Preservation Office (SHPO) concurred with the findings of the Cultural Landscape Inventories (CLIs) for these properties on 9/17/2004, 4/29/2016, and 9/17/2004, respectively. All three are eligible for the National Register of Historic Places at the national level under Criterion A in the areas of entertainment, recreation, and for their associations with the New Deal and the Catoctin Recreational Demonstration Area. They are also eligible under Criterion C for their associations with rustic architecture. Catoctin Mountain Park Cultural Landscape is also significant for its associations with the early iron industry of the United States. There are two periods of significance for the Catoctin Mountain Park Cultural Landscape. For its associations with the early iron industry, Catoctin Mountain Park has a period of significance from 1770 to 1902. For its associations with the RDA, the period of significance runs from 1934 and 1942 to encompass the years the RDA was developed. The period of significance for Camp Greentop runs from 1935, the year the site was approved for development as part of the RDA, to 1948 to encompass the addition of all contributing features within the camp. The period of significance for Camp Misty Mount runs from 1935, the year the site was approved for development as part of a RDA, to 1941, before alterations were made to the district by its military tenants during World War II. At the time the CLIs were completed, resources associated with the Mission 66 and Job Corps era had not reached its 50-year threshold. Within the next few years, the park plans to update its CLI to encompass these mid-century resources. Until then, the park is managing these resources as if they are contributing.

Ethnographic Resources Present: No

5. The proposed action will: (check as many as apply)

☒ Yes Destroy, remove, or alter features/elements from a historic structure

☐ No Replace historic features/elements in kind

☒ Yes Add non-historic features/elements to a historic structure

☒ Yes Alter or remove features/elements of a historic setting or environment (inc. terrain)

☒ Yes Add non-historic features/elements (inc. visual, audible, or atmospheric) to a historic setting or cultural landscape

☐ No Disturb, destroy, or make archeological resources inaccessible

☐ No Disturb, destroy, or make ethnographic resources inaccessible

☐ No Potentially affect presently unidentified cultural resources

☐ No Begin or contribute to deterioration of historic features, terrain, setting, landscape elements, or archeological or ethnographic resources

☐ No Involve a real property transaction (exchange, sale, or lease of land or structures)

☐ Other (please specify): _____

6. Supporting Study Data:

(Attach if feasible; if action is in a plan, EA or EIS, give name and project or page number.)

B. REVIEWS BY CULTURAL RESOURCE SPECIALISTS

The park 106 coordinator requested review by the park's cultural resource specialist/advisors as indicated by check-off boxes or as follows:

[X] 106 Advisor

Name: Allison Young

Date: 01/26/2021

Check if project does not involve ground disturbance []

Assessment of Effect: ___No Potential to Cause Effect ___No Historic Properties Affected X No Adverse Effect ___Adverse Effect ___Streamlined Review

Recommendations for conditions or stipulations:

Doc Method: Standard 4-Step Process

[X] Archeologist

Name: Jason Theuer

Date: 08/05/2021

Comments: Update 8/5/2021 - review of recently submitted report aligns with previous findings. No NRHP eligible archeological resources will be affected by this undertaking.

Check if project does not involve ground disturbance []

Assessment of Effect: ___No Potential to Cause Effect ___No Historic Properties Affected X No Adverse Effect ___Adverse Effect ___Streamlined Review

Recommendations for conditions or stipulations:

Doc Method: Standard 4-Step Process

[X] Archeologist

Name: Joshua Torres

Date: 01/12/2021

Comments: Comments from 4/7/2020: Project entails wide-scale infrastructural improvements throughout the park that will undoubtedly involve substantive ground disturbance.

Update 1/12/2021: Review of the Phase I archeological survey report was completed. The survey intensively investigated the APE for ground disturbing activities for adverse effects to archeological resources. The report concluded that no significant archeological resources would be impacted as a result of the proposed utility upgrades (as planned as of 1/12/2020). No additional work was recommended. I concur with this determination.

Check if project does not involve ground disturbance []

Assessment of Effect: ___No Potential to Cause Effect ___No Historic Properties Affected X No Adverse Effect ___Adverse Effect ___Streamlined Review

Recommendations for conditions or stipulations: Recommendations from 4/7/2021: Phase I survey of areas for ground disturbance within the APE in areas that have not been previously surveyed during the Archeological Overview and Assessment/Identification and Evaluation. This project will be a standard 4-Step approach to compliance. A formal determination of effects for archeology will be made once this archeological work is completed. Recommendations from 1/12/2021: None.

Doc Method: Standard 4-Step Process

[X] Historian

Name: Kathleen Wackrow

Date: 05/04/2021

Comments: Throughout the design process, SMEs have worked very closely with project managers to identify and mitigate effects to historic resources. For example, the rehabilitation of the Jim Brown Wellhouse, which is managed by the park as

contributing to the district, will be restored to its appearance during the period of significance. The removal of approximately 962 trees within the character-defining forested park landscape was carefully planned in consultation with the Regional Historic Landscape Architect to avoid significant visual gaps in the character-defining forested park landscape and a planting plan for native shrubs was prepared to mitigate open spaces in cabin camp areas and near the new treatment facility.

Check if project does not involve ground disturbance []

Assessment of Effect: ☐ No Potential to Cause Effect ☐ No Historic Properties Affected ☒ No Adverse Effect ☐ Adverse Effect ☐ Streamlined Review

Recommendations for conditions or stipulations: It is recommended that this project will have no adverse effect on the Catoctin Mountain Park Historic District/Cultural Landscape, Camp Misty Mount Historic District/Cultural Landscape, or Camp Greentop Historic District/Cultural Landscape or archeological resources. If, during ground penetrating activities, potential archeological artifacts are uncovered, it is the responsibility of the Project Managers to halt all work and contact the Park Cultural Resources Program Manager. If the project changes from what is presented in this PEPC Entry, it is also the responsibility of the Project Managers to immediately contact the Cultural Resources Program Manager to ensure compliance with Section 106 of the National Historic Preservation Act and the National Environmental Policy Act.

Doc Method: Standard 4-Step Process

[X] Historical Architect

Name: Elizabeth Milnarik

Date: 01/21/2021

Comments: Comments from May 24, 2021 in response to May 4 VE proposals:

1. A standing seam aluminum roof on the Centralized Treatment Building will have No Adverse Effect.
2. The 5/4 proposed location for fiber optic at the Round Meadow Gym will have No Adverse Effect. The 5/19 park-proposed revised location for fiber optic at the Visitor Center will have No Adverse Effect.

Check if project does not involve ground disturbance []

Assessment of Effect: ☐ No Potential to Cause Effect ☐ No Historic Properties Affected ☒ No Adverse Effect ☐ Adverse Effect ☐ Streamlined Review

Recommendations for conditions or stipulations: Comments from 1/21/2021: 1. These documents are in progress. If the topographic studies or design development alter the design significantly, that information should be provided to NCA reviewers. 2. Some documents indicate the water tanks at Greentop and Misty Mount are to be abandoned in place, but others say they are to be removed and leveled. The second approach is preferred. 3. Park Staff have been in communication on the Jim Brown Wellhouse, and no updated drawings were included for this structure. For the purpose of this review, it is assumed the single slope shed roof is to remain. 4. The proposed insulated translucent panel roof at the new Centralized Treatment Building represents a departure from the materiality of structures elsewhere in the park. It stands alone, will not impact any historic districts, and will be set back from the road, lessening visibility. It, however, is also sited on rising grade, increasing visibility, particularly when foliage is down. As the design develops, lowering the slope of the roof to minimize visibility would be preferable, as is possible, when balanced with use and water-shedding principles. 5. The Ike Smith Booster House and Blue Blazes Well House are to be abandoned in place. These will present a long-term concern for the park, as it will be difficult to justify maintenance for buildings that are not critical to the mission of the park. At a near future date, the park should plan for alternative uses for these buildings to ensure their long-term viability. Comments from April 1, 2021, in response to January 21 comments; 1. In response to Comment #3 above, the updated drawings for the Jim Brown Wellhouse match the historic character of the structure. This work will have No Adverse Effect. 2. In response to Comment #4 above, the revised roof slope and new, darker material for the translucent panel roof will minimize the visibility of this non-historic material to park users, improving visitor experience.

Doc Method: Standard 4-Step Process

[X] Historical Landscape Architect

Name: Julie McGilvray

Date: 05/10/2021

Comments: No Adverse Effect - Standard 4 step process

Check if project does not involve ground disturbance []

Assessment of Effect: ___ No Potential to Cause Effect ___ No Historic Properties Affected ___ X No Adverse Effect ___ Adverse Effect ___ Streamlined Review

Recommendations for conditions or stipulations:

Doc Method: Standard 4-Step Process

No Reviews From: Curator, Other Advisor, Anthropologist

C. PARK SECTION 106 COORDINATOR'S REVIEW AND RECOMMENDATIONS

1. Assessment of Effect:

___ No Potential to Cause Effects
___ No Historic Properties Affected
___ X No Adverse Effect
___ Adverse Effect

2. Documentation Method:

[X] A. Standard 36 CFR Part 800 Consultation

Further consultation under 36 CFR Part 800 is needed.

[] B. Streamlined Review Under the 2008 Servicewide Programmatic Agreement (PA)

The above action meets all conditions for a streamlined review under section III of the 2008 Servicewide PA for Section 106 compliance.

Applicable Streamlined Review Criteria

(Specify 1-16 of the list of streamlined review criteria.)

[] C. Undertaking Related to Park Specific or Another Agreement

The proposed undertaking is covered for Section 106 purposes under another document such as a park, region or statewide agreement established in accord with 36 CFR 800.7 or 36 CFR 800.14.

[] D. Combined NEPA/NHPA Process

Process and documentation required for the preparation of an EA/FONSI or an EIS/ROD to comply with Section 106 is in accord with 36 CFR 800.8.c.

[] E. Memo to Project File

3. Consultation Information

SHPO Required: Yes

SHPO Sent: Aug 11, 2021

SHPO Received:

THPO Required: No

THPO Sent: Aug 11, 2021

THPO Received:

SHPO/THPO Notes: Formal consultation with the SHPO (Maryland Historic Trust) was initiated on December 18, 2020. The park submitted a formal cover letter, the schematic design drawings from 6/29/2020, the draft archeological survey report from 12/18/2020, photographs of the project area, a map identifying the Project Area and Area of Potential Effect, and draft PEPC ESF and Section 106 forms that include potentially impacted resources, but no effects assessment (see attached consultation package). SHPO responded to the park on 2/2/2021: We are particularly interested in NPS's proposed treatment of any contributing resources involved in the undertaking, such as the abandonment of the well houses and booster stations which contribute to the district, as well as overall efforts to avoid and minimize impacts to historic properties. Looking forward to receiving the NPS findings of effects. Formal consultation with THPOs was initiated on February 10, 2021. The park submitted the same package sent to SHPO. The park submitted the Assessment of Effects to the SHPO & THPOs for review on 8/11/2021.

Advisory Council Participating: No

Advisory Council Notes:

Additional Consulting Parties: No

4. Stipulations and Conditions: Following are listed any stipulations or conditions necessary to ensure that the assessment of effect above is consistent with 36 CFR Part 800 criteria of effect or to avoid or reduce potential adverse effects.

If the scope of this project alters from what is presented in this PEPC Entry, it is the responsibility of the project manager to consult with the Park Section 106 Coordinator to ensure that the park complies with Section 106 of the National Historic Preservation Act and the Programmatic Agreement between the State Historic Preservation Offices and the National Park Service. In regards to the Jim Brown Well House, the current shape and style of the mono-sloped roof must be retained. Additionally, the existing non-historic vinyl fascia and soffit must be replaced with wood. In regards to the Stone Wall near the visitor center and the Saw Mill Race, which are contributing features to the Catoctin Mountain Park Historic District and Cultural Landscape, the park plans on replacing underground utilities beneath each. The park must complete this work without disturbing these features by pipe-splitting, hand-trenching beneath the structures, or directional boring. Regarding the proposed work on the existing water tanks, it is the preference of the PEPC IDT to completely remove these tanks, rather than abandon-in-place. The mothballing of the Ike Smith Pumphouse and Blue Blazes Well House must be completed in accordance with "NPS Preservation Brief #31 - Mothballing Historic Buildings." Any future plans for these buildings will be addressed in a separate PEPC Entry/SHPO/THPO consultation. All work must be completed in compliance with "The Secretary of the Interior's Standards for the Treatment of Historic Properties."

5. Mitigations/Treatment Measures: Measures to prevent or minimize loss or impairment of historic/prehistoric properties: (Remember that setting, location, and use may be relevant.)

No Assessment of Effect mitigations identified.

6. Assessment of Effect Notes:

Overall, this project will have no adverse effect on historic resources. In regards to the rehabilitation of the Jim Brown Well House, the proposed replacement of the rolled asphalt roof with standing seam metal will not be visible from the ground level due to the low pitch of the roof. It also includes the restoration of the soffit and fascia from non-historic vinyl to its historic wood appearance. The abandonment and temporary mothballing of the Ike Smith Pumphouse and Blue Blazes Well House will not compromise the qualities that make these buildings contributing and potentially contributing to the historic district. Mothballing will be completed in accordance with "NPS Preservation Brief #31" for a temporary period while the park discusses future uses for these buildings. Future plans will be addressed in a separate PEPC entry/SHPO/THPO consultation. The installation of fiber optic cable at the Visitor Center and Gymnasium will occur alongside existing utilities and will not be visible to the public. The results of a Phase 1 Archeological Survey found that no resources eligible for listing in the National Register will be compromised in association with this project and no additional survey is required. The new Centralized Treatment Facility is designed to blend in with the surrounding landscape. The new development will not compromise the qualities that make the park a cultural landscape/historic district, nor will it compromise contributing resources within view, such as Park Central Road. Similarly, the replacement of a few small utility structures and the rehabilitation of existing structures will not change the appearance of the cultural landscape/historic district. The removal of trees in alignment with the installation of underground utilities was designed to avoid visual impacts to the cultural landscapes/historic districts. Design include narrow, zig-zagging routes, largely in alignment with extant roads and walkways, and a re-planting plan.



ENVIRONMENTAL SCREENING FORM (ESF)

Updated Sept 2015 per NPS NEPA Handbook

A. PROJECT INFORMATION

Project Title: Replace Parkwide Utility Infrastructure
PEPC Project Number: 88406
PMIS Number:
Project Type: Repair/Rehabilitation (REHAB)
Project Location:
County, State: Washington, Maryland
County, State: Frederick, Maryland
Project Leader: Troy Strawn

B. PROJECT DESCRIPTION

The National Park Service proposes to replace and improve all primary and portions of secondary utility systems under jurisdiction of Catoctin Mountain Park. Utility systems associated with this project include potable water, sanitary sewer, electrical power, and communications. This project is intended to replace rapidly deteriorating, existing infrastructure that range in age from 20 to 80 years with new systems that meet up-to-date local, state, and national operational standards. At present, these outdated utilities are significantly impacting the natural environment, and visitor and employee health and safety.

It will replace an outdated potable water treatment and distribution system, including rehabilitation of fire hydrants. The communication network will be significantly upgraded, eliminating redundant systems and linking offices Parkwide. Additionally, the integrated communication technology will allow facilities management professionals to monitor real-time water flow, treatment, storage, and distribution systems and will replace unreliable/non-functional, cell-based telemetry.

The proposed project encompasses:

- The construction of a new centralized treatment building and water tank between Camp David and Park Central Road, located approximately 500 feet from the existing water storage tank that services Camp Greentop, to service Camp Greentop, Camp Round Meadow, and Camp Misty Mount.
- The decommission and/or demolition of five water tanks that currently service Camp Misty Mount, Camp Greentop, and Camp Round Meadow, which are all buried beneath mounds of dirt.
- The rehabilitation of four wells located within the Jim Brown and Poplar Grove areas to supply raw water to the new centralized treatment building and water storage tank.
- The rehabilitation of three buildings, Jim Brown Well House No. 1, Poplar Grove Well House No. 1, and Ike Smith Well House. The well houses at Jim Brown and Poplar Grove will be rehabilitated in association with the new centralized treatment building and water storage tank, while the Ike Smith Well House will be rehabilitated to service the stand-alone system at Owens Creek Campground. Jim Brown Well House No. 1 is managed by the NPS as contributing to the Catoctin Mountain Park Historic District and will be rehabilitated in accordance with The Secretary of the Interior's Standards for Rehabilitation.
- The replacement of existing underground primary water mains associated with Camp Misty Mount and Camp Round Meadow.
- The replacement of existing underground primary sewer mains associated with Camp Misty Mount, Camp Round Meadow, and Camp Greentop.
- The rehabilitation of the Camp Greentop lift station and the replacement of the Camp Round Meadow lift station.
- The replacement of the existing primary site electrical, including transformer replacement, associated with Camp Misty Mount, Camp Round Meadow, and Camp Greentop.
- The installation of a new fiber-optic backbone between the new centralized treatment building, the Camp

Round Meadow Gym, and the Catoctin Mountain Park Visitor Center, with hardwire nodes to connect the various treatment facilities (well houses, lift station, centralized treatment building, and water storage tank). • The abandonment-in-place of the Ike Smith Booster Station, Blue Blazes Well House No. 1, and Blue Blazes Well House No. 2. In the 2014 National Register Nomination for Catoctin Mountain Park, the Ike Smith Booster Station is listed as a contributing building to the historic district. The NPS manages the Blue Blazes Well House No. 1 as contributing to the historic district. Both buildings will be temporarily mothballed in accordance with NPS Preservation Brief #31 until the park evaluates the future use of the building. • The trenching of utility corridors, totaling approximately 6.5 miles long, in association with the replacement of existing or installation of new underground utility lines. • The rehabilitation, replacement, or installation of approximately 72 additional utility structures in association with proposed work within utility corridors. Related utility structures include sanitary sewer manholes, air valves, water meters, sewer meters, electrical meters, fire hydrants, fiber-optic splice boxes, pressure relief valves, and staging areas. • The removal of approximately 962 trees that are (1) directly impacted by the proposed project or (2) trees that will not have a sufficient critical root zone and therefore the impact would be detrimental to the tree species. Tree removal designs were prepared in close consultation with a qualified NPS Historic Landscape Architect to limit visual impacts to cultural landscapes and historic districts. • The use of existing parking areas near segments of the project as staging areas.

For a narrative of project details and associated drawings, please refer to the attached documents entitled "Basis of Design Report" and "Design Development Drawings." For detailed information on the Archeological Investigations associated with this project, please refer to the documents entitled "Phase I Archeological Survey" (2020) and "Addendum Phase I Archeological Survey" (2021).

This project will occur within the boundaries of three properties identified as both cultural landscapes and districts listed on the National Register of Historic Places: Catoctin Mountain Park Historic District, Camp Greentop Historic District, and Camp Misty Mount Historic District.

C. RESOURCE IMPACTS TO CONSIDER:

Resource	Potential for Impact	Potential Issues & Impacts
Air Air Quality	None	
Biological Nonnative or Exotic Species <i>Invasive Exotic Species</i>	Potential	Issue: Seeds and plant parts of invasive exotic plants could be brought in on equipment and introduced to the park or spread to new areas. Impact: No significant impact. All caked-on dirt, mud, and seeds will be washed off before equipment is brought to the park. Equipment will be cleaned off between sites within the park.
Biological Species of Special Concern or Their Habitat <i>Rare, Threatened & Endangered Plant/Animal Species & Essential Fish Habitat</i>	Potential	Issue: Rare, threatened, and endangered plant and animal species could be impacted by the digging of trenches and removal of trees for this project. Impact: No significant impact. Trees will be removed outside of the bat pupping season. Consultation with the USFWS determined that this project will not be likely to adversely effect bat species of concern (Northern long-eared and Indiana bats). Some state listed rare, threatened, and endangered plants will be destroyed or trampled, but the number will be limited to the minimum possible and there are significant populations of these plants outside the limits of disturbance in these areas (nodding trillium and bashful bulrush). Consultations were done with USFWS and MD Natural Heritage. Surveys were done for a park-provided list of rare, threatened, and endangered plants. Two state-listed plants were found within the limits of disturbance. These were bashful bulrush

Resource	Potential for Impact	Potential Issues & Impacts
		(Tricophorum planifolium) S2 rare and nodding trillium (Trillium cernuum) S3 watchlist. Less than 1% of known populations would be impacted. Complete results will be attached to the final document. Tree removal will be minimized when possible (approximately 500 trees). Effects to Owens Creek (significant brook trout area) will be minimized with silt control measures.
Biological Vegetation <i>Mature Trees</i>	Potential	<p>Issue: Approximately 500 trees are slated to be removed as part of this project, including mature trees. Loss of large trees may lead to more edge effect, thus changing species composition.</p> <p>Impact: No significant impact. Overall, the project is designed to limit the number of trees to be removed and edge effect.</p>
Biological Wildlife and/or Wildlife Habitat including terrestrial and aquatic species	None	
Cultural Archeological Resources <i>Potential Archeological Resources</i>	Potential	<p>Issue: This project involves ground-disturbing activities in association with the installation and replacement of utilities. For a full description of these ground-disturbing activities, please refer to the attached Phase I Archeological Survey Report. Prior to this project, the NPS has overseen a total of 6 archeological surveys within the project area; these previous surveys identified a total of 21 sites. In October 2020, Jacobs Engineering Group, led by a Secretary of the Interior Qualified Archeologist, conducted a Phase I Archeological Survey of all project areas with proposed ground disturbance. The survey area consisted of 10.5-kilometer (6.5-mile) long utility corridor; a 6.1 by 6.1-meter (20' x 20') radius for all manhole, air vent, geotechnical drilling, and subsurface evaluation hole locations; and a 12.2 by 12.2-meter (40' x 40') radius for any proposed lift stations. The total area for the Phase I archeological survey measures 6.42 hectares (15.87 acres). ADD INFO ABOUT ADDENDUM</p> <p>Impact: No significant impact. As a result of the Phase I Archeological Survey, Jacobs Engineering Group identified one new archeological site and investigated the 21 previously inventoried sites that intersect or are within 30.5 meters (100') of the project area. In their draft report, which is attached to this PEPC documentation, Jacobs recommends that the 21 previously identified sites do not meet eligibility criteria for listing in the National Register. Jacobs also recommends that the newly identified site (18FR1113), which is a late historic/ modern refuse/ dump site, also does not meet eligibility criteria for listing in the National Register. Jacobs recommends that there will be no significant impacts on archeological resources and no additional archaeological work is necessary for the Project. Please refer to the attached archeological report for more information.</p>
Cultural Cultural Landscapes	Potential	Issue: This project will occur within the boundaries of the Camp Greentop Cultural Landscape. In 2015, the NPS completed a Cultural Landscape Inventory for Camp Greentop, a WPA era log cabin camp that was initially constructed by the Catoctin Recreational Demonstration

Resource	Potential for Impact	Potential Issues & Impacts
<p><i>Camp Greentop Cultural Landscape</i></p>		<p>Area (RDA) in 1938 for the Maryland League for Crippled Children and updated during the Mission 66 era. The State Historic Preservation Office concurred with the findings of the CLI on 4/29/2016 that this component landscape is eligible for listing in the National Register of Historic Places. The cultural landscape is significant at the national level under Criterion A for its association with entertainment, recreation, and social history for its representation of the New Deal. It is also eligible at the national level under Criterion C for its significance in the Park Rustic style of architecture and landscape architecture. The period of significance for the district begins in 1935, the year the site was approved for development as part of the RDA and ends in 1948 to encompass the addition of all contributing features within the camp. At the time of the CLI, resources associated with the Mission 66 and Job Corps era had not reached its 50-year threshold. In 2022, the park will update its CLI to encompass these mid-century resources. Until then, the park is managing these resources as contributing to the landscape. This project proposes to rehabilitate an existing sanitary lift station at the southernmost edge of the property. This project also includes the replacement of existing underground sanitary sewer and electrical lines. The park proposes to install a new fire hydrant just west of the existing, non-historic horse barn, and just east of the contributing landscape feature, Playfield and Pasture, along the contributing Main Gravel Loop Road. This project also involves the removal of trees within the landscape to accommodate the installation of underground utilities.</p> <p>Impact: No significant impact. Overall, this project will have no significant impact on the Camp Greentop Cultural Landscape. The sanitary lift station is located well out of view of the contributing features of the landscape. The rehabilitation work is largely in-kind and will not significantly alter the appearance of the existing station. Although within view of two contributing landscape features, the Playfield and Pasture and the Main Gravel Loop Road, the installation of a new fire hydrant will not detract from the qualities that make the Playfield and Pasture and Main Gravel Loop Road contributing to the cultural landscape. For an evaluation of impacts to archeological resources, please refer to the section entitled "Potential Archeological Resources." This project will require the removal of trees within the camp. The tree removal was designed in close consultation with the NPS Historic Landscape Architect to avoid effects to the cultural landscape. Designs within the cabin camps include narrow, zig-zagging routes, largely along existing roads and walkways, intended to limit visual impacts associated with tree removal. The park also incorporated a planting plan for native shrubs to mitigate impacts of open spaces in Camp Greentop.</p>
<p>Cultural Cultural Landscapes <i>Camp Misty Mount Cultural Landscape</i></p>	<p>Potential</p>	<p>Issue: This project will occur within the boundaries of the Camp Misty Mount Cultural Landscape. In 2006, the NPS completed a Cultural Landscape Inventory for Camp Misty Mount, a WPA-era log cabin camp initially constructed by the Catoclin RDA in 1936. The State Historic Preservation Office concurred with the findings of the CLI on 9/17/2004 that the property is eligible for listing on the National Register of Historic Places. The property is eligible at the national level under Criterion A as</p>

Resource	Potential for Impact	Potential Issues & Impacts
		<p>representative of the “human and natural conservation efforts of the New Deal” (2004 CLI). It is also eligible at the national level under Criterion C for its rustic architecture. Its period of significance runs from 1935, the year the site was approved for development as part of a RDA, to 1941, just before alterations were made to the district by its military tenants during World War II. The project proposes to demolish (either in full, or partially) one non-historic 30,000-gallon, FRP water tank at Camp Misty Mount that is that is buried beneath a large mound of earth. This project also involves underground utilities. This project proposes to abandon existing water lines, install a new water supply line, install new fiber optic communication lines, replace water service laterals, and replace sanitary sewer laterals. This project also proposes to relocate three fire hydrants throughout the camp to optimize structural fire-fighting and replace in-kind the current locations of two fire hydrants. This project also involves the removal of trees within the landscape to accommodate the installation of underground utilities.</p> <p>Impact: No significant impact. Overall, this project will have no significant impact on the Camp Misty Mount Cultural Landscape. The water tank at Camp Misty Mount was installed in 1986, well after the period of significance, and its removal will not compromise the qualities that make the site a cultural landscape. The installation of new and replacement of existing underground utility lines will not make any alterations to the existing landscape. For an evaluation of impacts to archeological resources, please refer to the section entitled "Potential Archeological Resources." This project will require the removal of trees within the camp. The tree removal was designed in close consultation with the NPS Historic Landscape Architect to avoid effects to the cultural landscape. Designs within the cabin camps include narrow, zig-zagging routes, largely along existing roads and walkways, intended to limit visual impacts associated with tree removal. The park also prepared a planting plan for native shrubs to mitigate impacts to newly open areas within Misty Mount. The new slightly locations for the tree hydrants and in-kind replacement of the other two will not compromise the qualities that make Camp Misty Mount a cultural landscape.</p>
Cultural Cultural Landscapes <i>Catoctin Mountain</i> <i>Park Cultural</i> <i>Landscape</i>	Potential	<p>Issue: This project will occur within the boundaries of the parent cultural landscape, Catoctin Mountain Park. In 2002, the NPS completed a CLI for Catoctin Mountain Park. The SHPO concurred with the findings on 9/17/2004 that it is eligible for listing in the National Register. This property has two periods of significance. It is eligible at the national level under Criterion A for its association with the early iron industry of the US between 1770 and 1902, when the Catoctin Iron Furnace was active. It is also significant as an RDA between 1934 and 1942 to encompass the years the RDA was developed. At the time of the CLI, resources associated with the Mission 66 and Job Corps era had not reached its 50-year threshold. In 2022, the park will update its CLI to encompass these mid-century resources. Until then, the park is managing these resources as if they are contributing. NEW TREATMENT BUILDING & WATER TANK AREA: The park proposes to install a new development east of Park Central Road and south of Camp David, within a mixed deciduous</p>

Resource	Potential for Impact	Potential Issues & Impacts
		<p>forest. An existing pair of buried water tanks that service Camp Greentop is located approximately 500' to the east. The proposed development consist of an entrance gate and an L-shaped paved-asphalt driveway extending from Park Central Road, through the woods, to a 38'-8"L x 15'-4"W x 10'H, front gabled treatment building with a concrete slab foundation, brown-painted cedar board-and-batten-siding, and a standing-seam dark-bronze metal, low-pitched roof. Just west of the building, the park proposes to install a 60,000-gallon cast-in-concrete water storage tank that measures 77'L x 19.33'W x 10'H. The tank will be buried within a mound of earth, matching existing tanks nearby. In the 2004 CLI, the Park Central Road is identified as a contributing feature. The section of Park Central Road that is within view of the project area was re-aligned in 1977. WATER TANKS: The park proposes to demolish and/or abandon in-place five water storage tanks, which are all buried beneath an above-grade mound of earth. The project includes the demolition of a pair of two existing underground 30,000-gal. FRP water tanks in close proximity to the proposed new treatment building that currently support Camp Greentop and either the full or partial demolition of three other matching: one at Camp Misty Mount and two at the Jim Brown Well area that supports Camp Round Meadow. A partial demolition would encompass removing the top of the tank, filling-in below-grade portions of the tank and restoring the soil surface. These water tanks were installed in and after 1986. WELL HOUSES: The park proposes to rehabilitate three well houses, including one, the Jim Brown Well House (Building 174), that is managed by the NPS as contributing. The Jim Brown Well House was constructed in 1966 by the Job Corps. The park proposes to replace the building's existing mono-sloped, rolled asphalt roof, vinyl fascia, and 15' sq. skylight with a new, removable, mono-sloped, standing-seam metal roof, with a wood fascia, and wood soffit. The park proposes the in-kind replacement of the exterior door, frame, and hardware with heavy-duty hollow metal door and stainless steel frame, matching the existing. This project also includes the replacement of equipment on the interior of the building, including piping, heating, and well components. This project also proposes to abandon three well houses, including two that are historic: Blue Blazes Well House No. 1 and the Ike Smith Pumphouse. The Blue Blazes Well House was constructed in 1965 by the Job Corps and is managed by the park as contributing. Constructed in 1938, the Ike Smith Pumphouse is listed in the 2002 CLI as contributing to the cultural landscape. Both buildings will be temporarily mothballed until the park makes a formal decision as to the future use of these two buildings. FIBER OPTIC CABLE: The park also proposes to route fiber optic cables through two buildings managed by the NPS as contributing. The Catoctin Mountain Park Visitor Center was constructed in 1941 as a visitor contact station for the Catoctin RDA. In 1965, the NPS made substantial improvements to the building to align with Mission 66 initiatives. The Gymnasium was constructed by the Job Corps in 1968-1969 as a recreational center. The NPS made improvements to the building in 1981 to incorporate conference rooms. TREES: This project proposes to remove 500 trees throughout the park in association with the installation of underground utilities.</p>

Resource	Potential for Impact	Potential Issues & Impacts
		<p>Impact: Overall, this project will have no significant impact on the cultural landscape. NEW TREATMENT BUILDING & WATER TANK AREA: This portion of the project will have no significant impact on the contributing landscape feature, Park Central Road. The building and water storage tank are proposed to be installed approximately 70'-160' from the road and will be painted carriage brown to blend in with the surrounding landscape. During winter months, the driveway, treatment building, and water tank will all likely be visible from Park Central Road due to the lack of leaves on trees. During the spring, summer, and fall, only portions of the development will likely be visible from the road due to screening associated with the trees. This project will not compromise the qualities that make Park Central Road contributing to the Catoclin Mountain Park Cultural Landscape. WELL HOUSES: This portion of the project will have no significant impact on the contributing landscape feature, the Jim Brown Well House. The change in roofing material from rolled asphalt to standing seam metal will not be visible from the ground level and will therefore not compromise the integrity of the mid-century building. The portion of the project that involves the abandonment of the historic Blue Blazes Well House No. 1 and the Ike Smith Pumphouse will have no significant impact on the cultural landscape. Although these two buildings will no longer be used for their historic purpose, they will be mothballed in accordance with "NPS Preservation Brief #31: Mothballing Historic Buildings" until the park decides what to do with the buildings. Any future plans associated with these buildings will be submitted in a separate PEPC entry/SHPO/THPO consultation. WATER TANKS: This portion of the project will have no significant impact on the cultural landscape. The water tanks proposed to be removed as part of this project were constructed in 1985 and afterward, well after the period of significance for the cultural landscape. This removal of non-historic elements from the park will have no significant impact on cultural landscapes. UNDERGROUND UTILITIES: This project also proposes to replace and install new underground utility lines and aboveground structures. This portion of the project will not alter the existing views within the cultural landscape. The in-kind replacement of utilities will have no significant impact on the cultural landscape. For an evaluation of impacts to archeological resources, please refer to the section entitled "Potential Archeological Resources." SMALL-SCALE UTILITY STRUCTURES: This project proposes to replace existing and install new lifting stations, wells, and small-scale features associated with the underground utilities, including sanitary sewer manholes, air valves, water meters, sewer meters, electrical meters, fire hydrants, fiber-optic splice boxes, pressure relief valves, and staging areas. These are limited and will have no significant impact on the cultural landscape. TREES: This project will require the removal of 500 trees associated with the installation of underground utilities. The tree removal was designed in close consultation with the NPS Historic Landscape Architect to avoid effects to the cultural landscape. In developed and public areas, designs include narrow, zig-zagging routes intended to limit visual impacts associated with tree removal. It will have no significant impact on the cultural landscape.</p>

Resource	Potential for Impact	Potential Issues & Impacts
Cultural Ethnographic Resources	None	
Cultural Museum Collections	None	
Cultural Prehistoric/historic structures <i>Blue Blazes Pumphouse (Building 168)</i>	Potential	<p>Issue: Constructed in 1965 by the Job Corps, the Blue Blazes Pumphouse (identified in the design documents as "Blue Blazes Well House No. 1") is managed by the NPS as contributing to the National Register-listed historic district, Catoctin Mountain Park. Mission 66 and Job Corps era resources were not evaluated for eligibility in the 2014 National Register Nomination for Catoctin Mountain Park. In 2022, the park will update the nomination to evaluate Mission 66 and Job Corps Era resources. Until this project is complete, the NPS is managing this building as contributing to the district. This pumphouse has been used by the park as a pumphouse since its construction. In association with the centralization of the park's utilities, the park proposes to discontinue using the pumphouse as part of its utility system. The park intends on mothballing the building until determining its future use.</p> <p>Impact: No significant impact. While the pumphouse will no longer be used for its original purpose, this project will not compromise the building's historic integrity. The park plans to temporarily mothball the building in accordance with "NPS Preservation Brief #31 - Mothballing Historic Buildings" until determining the future use of the building. As future projects develop, the park will initiate a separate PEPC entry and SHPO/THPO consultation effort.</p>
Cultural Prehistoric/historic structures <i>Camp Greentop Historic District</i>	Potential	<p>Issue: This project occurs within the boundaries of the Camp Greentop Historic District, which was listed on the National Register of Historic Places in 1989 as part of a larger Multiple Property Documentation Submission for Emergency Conservation Work Era Architecture at Catoctin Mountain Park. Camp Greentop was constructed in the late 1930s by the Works Progress Association as a cabin camp for use by the Maryland League for Crippled Children. The NPS made improvements to the camp during the Mission 66 period, which included the construction of a centralized, Modern style dining hall/recreation hall. Camp Greentop is eligible for listing in the National Register at the state and local levels under Criteria A and C in the areas of Architecture, Conservation, and Entertainment/Recreation for its associations with the Catoctin Mountain Park RDA and for its examples of rustic architecture. The period of significance runs from 1935, when the RDA was first developed, to 1938 to encompass the construction of all associated WPA-era buildings in the camp. At the time the nomination was completed, resources associated with the Mission 66 era had not reached its 50-year threshold. Within the next few years, the park plans to update the nomination for Catoctin Mountain Park, which encompasses Camp Greentop, to encompass these mid-century resources. Until then, the park is managing Mission 66 era resources as if they are contributing. This project proposes to rehabilitate an existing sanitary lift station at the southernmost edge of the property. This project also includes the replacement of existing underground</p>

Resource	Potential for Impact	Potential Issues & Impacts
		<p>sanitary sewer and electrical lines. The park proposes to install a new fire hydrant just west of the existing, non-historic horse barn, and just east of the contributing landscape feature, Playfield and Pasture, along the contributing Main Gravel Loop Road. This project will require the removal of trees in association with the installation of underground utilities.</p> <p>Impact: No significant impact. Overall, this project will have no significant impact on the Camp Greentop Historic District. The sanitary lift station is located well out of view of the contributing features of the landscape. The rehabilitation work is largely in-kind and will not significantly alter the appearance of the existing station. The replacement of underground sewage and electrical lines will not alter the physical appearance of the district. Although within view of mid-century resources managed as contributing, such as the Dining Hall/Recreation Hall and the Greentop Stable Office, the installation of a new fire hydrant will not detract from the qualities that make these contributing to the historic district. For an evaluation of impacts to archeological resources, please refer to the section entitled "Potential Archeological Resources." This project will require the removal of trees within the camp. The tree removal was designed in close consultation with the NPS Historic Landscape Architect to avoid effects to the cultural landscape. Designs within the cabin camps include narrow, zig-zagging routes that largely align with existing roadways and walkways, intended to limit visual impacts associated with tree removal. The removal of a select number of trees within the camp will not significantly impact the appearance of the historic district.</p>
Cultural Prehistoric/historic structures <i>Camp Misty Mount</i> <i>Historic District</i>	Potential	<p>Issue: This project occurs within the boundaries of the Camp Misty Mount Historic District, which was listed on the National Register of Historic Places in 1989 as part of a larger Multiple Property Documentation Submission for Emergency Conservation Work Era Architecture at Catoctin Mountain Park. Camp Misty Mount was constructed in the late 1930s by the Works Progress Association as a cabin camp for use by a wide range of organizations and members of the public. Camp Misty Mount is eligible for listing in the National Register at the state and local levels under Criteria A and C in the areas of Architecture, Conservation, and Entertainment/Recreation for its associations with the Catoctin Mountain Park RDA and for its examples of rustic architecture. The period of significance runs from 1935, when the RDA was first developed, to 1938 to encompass the construction of all associated WPA-era buildings in the camp. This project proposes to demolish (either in full, or partially) one non-historic 30,000-gallon, FRP water storage tank at Camp Misty Mount that is buried beneath a large mound of earth. This project also involves underground utilities. This project proposes to abandon existing water lines, install a new water supply line, install new fiber optic communication lines, replace water service laterals, and replace sanitary sewer laterals. In association with the installation of underground utilities, this project requires the removal of a select number of trees within the district.</p>

Resource	Potential for Impact	Potential Issues & Impacts
		<p>Impact: No significant impact. Overall, this project will have no significant impact on the Camp Misty Mount Historic District. The water tank at Camp Misty Mount was installed in 1986, well after the period of significance, and its removal will not compromise the qualities that make the site a historic district. The installation of new and replacement of existing underground utility lines will not make any alterations to the existing landscape. For an evaluation of impacts to archeological resources, please refer to the section entitled "Potential Archeological Resources." This project will require the removal of trees within the camp. The tree removal was designed in close consultation with the NPS Historic Landscape Architect to avoid effects to the cultural landscape. Designs within the cabin camps include narrow, zig-zagging routes that largely align with existing roads and walkways, intended to limit visual impacts associated with tree removal. The removal of trees will not compromise the densely forested landscape of the district.</p>
<p>Cultural Prehistoric/historic structures <i>Camp Round Meadow Gymnasium</i></p>	Potential	<p>Issue: This project involves installing a fiber optic cable on exterior and interior surfaces of Camp Round Meadow Gymnasium, a building managed by the NPS as contributing to the Catoctin Mountain Park Historic District. At the time the nomination was prepared, park resources associated with the Mission 66 Era was not evaluated for National Register eligibility. Subsequently the Gymnasium, which was significantly updated during the Mission 66 period, is identified as non-contributing to the historic district. The park has applied for 2021 funding to update the existing nomination to evaluate Mission 66-related resources. Until this project is complete, the park is managing the Gymnasium as contributing to the district. The Gymnasium was constructed in 1968-1969 by the Job Corps as part of the first Job Corps Center in the United States, the Catoctin Job Corps Center. In 1983, the NPS remodeled a section of the building to be used as conference rooms. In an effort to connect fiber optic cable to offices and public spaces, this project proposes to route a fiber optic cable vertically the rear south exterior elevation of the Gymnasium, piercing the rear of the building run alongside existing utility lines to the Communications Room to connect with equipment. The fiber optic cable is composed of PVC or HPDE Conduit, 2" in diameter, and painted to match the existing colors of the walls.</p> <p>Impact: No significant impact. On the exterior the conduit will be completely screened from public view by a fence. The conduit will run alongside existing utilities. It will not compromise the qualities that make the Gymnasium contributing to the Catoctin Mountain Park Historic District.</p>
<p>Cultural Prehistoric/historic structures <i>Catoctin Mountain Park Historic District</i></p>	Potential	<p>Issue: This project will occur within the boundaries of Catoctin Mountain Park Historic District. Its nomination was accepted by the Keeper of the National Register on June 24, 2014. The district is eligible for the National Register under Criteria A, B, C, and D in the areas of Architecture, Archeology, Entertainment/Recreation, Industry, and Military. Its period of significance runs from 3,000 BCE to 1954 CE. For those resources specific to Camp David, it has a second period of</p>

Resource	Potential for Impact	Potential Issues & Impacts
		<p>significance which runs from 1952 to 1978. At the time the nomination was prepared, park resources associated with the Mission 66 Era was not evaluated for National Register eligibility. In 2022, the park will update the existing nomination to evaluate Mission 66- and Job Corps-related resources. At present, resources associated with the Job Corps and Mission 66 era are managed by the NPS as contributing to the historic district. Major areas and resources within the historic district that are impacted by this project include (from north to south): Owen's Creek Campground, Foxville-Deerfield Road, Ike Smith Pumphouse, Chestnut Picnic Area, Manahan Road, Camp Greentop Historic District, Park Central Road, Fire Cache Area/Jim Brown Well House, Camp Round Meadow, Camp Misty Mount, Main Maintenance, Building 167-Employee Residence, Quarters 1 House & Garage, Blue Blazes Stone Walls & Headwalls, and the Catoctin Mountain Park Visitor Center. This project directly impacts five historic buildings, including one, the Ike Smith Pumphouse (1938), which was constructed by the RDA as a pumphouse and is identified in the National Register nomination as contributing. The Blue Blazes Well House No. 1 (1966), the Jim Brown Well House (1965), and the Gymnasium (1968-1969) at Camp Round Meadow were constructed by the Job Corps and are managed by the park as contributing. The Catoctin Mountain Park Visitor Center (1941) was constructed as a visitor contact station for the Catoctin RDA and in 1965, the NPS made significant updates to the building in alignment with Mission 66 initiatives. As part of this project, the park proposes to discontinue using the Ike Smith Pumphouse and Blue Blazes Well House No. 1; rehabilitate the Jim Brown Well House; and add fiber optic cables to the Visitor Center and Gymnasium. This project also proposes to install a new centralized treatment facility within a forested area north of Park Central Road. The remainder of historic resources within the district are indirectly impacted by the project, with temporary visual effects, such as trenching, and minor visual effects, such as the in-kind replacement or rehabilitation of existing aboveground utility structures, such as fire hydrants. In certain locations, the project area appears to intersect contributing features, such as the Saw Mill Race in Owen's Creek Campground and the Stone Wall and Stone Headwalls near the Visitor Center. In both instances, underground utilities will be replaced via pipe-splitting methods to avoid impacts to historic resources. This project also proposes to remove 500 trees throughout the park to accommodate the installation of underground utilities.</p> <p>Impact: No significant impact. NEW TREATMENT BUILDING & WATER TANK AREA: This portion of the project will have no significant impact on the contributing structure, Park Central Road. The building and water storage tank are proposed to be installed approximately 130-240' from the road and will be painted carriage brown to blend in with the surrounding landscape. During winter months, the driveway, treatment building, and water tank will all likely be visible from Park Central Road due to the lack of leaves on trees. During the spring, summer, and fall, only portions of the development will likely be visible from the road due to screening associated with the trees. This project will not compromise the qualities that make Park Central Road</p>

Resource	Potential for Impact	Potential Issues & Impacts
		<p>contributing to the Catoctin Mountain Park Historic District. WELL HOUSES: This portion of the project will have no significant impact on the Jim Brown Well House. The change in roofing material from rolled asphalt to standing seam metal will not be visible from the ground level and will therefore not compromise the integrity of the mid-century building. The portion of the project that involves the abandonment of the historic Blue Blazes Well House No. 1 and the Ike Smith Pumphouse will have no significant impact on the cultural landscape. Although these two buildings will no longer be used for their historic purpose, they will be mothballed in accordance with "NPS Preservation Brief #31: Mothballing Historic Buildings" until the park decides what to do with the buildings. Any future plans associated with these buildings will be submitted in a separate PEPC entry/SHPO/THPO consultation. WATER TANKS: This portion of the project will have no significant impact on the historic district. The water tanks proposed to be removed as part of this project were constructed in 1985 and afterward, well after the period of significance for the cultural landscape. This removal of non-historic elements from the park will have no significant impact on the historic district. UNDERGROUND UTILITIES: This project also proposes to replace and install new underground utility lines and aboveground structures. This portion of the project will not alter the existing views from contributing resources to the historic district. The in-kind replacement of utilities will have no significant impact on the historic district. For an evaluation of impacts to archeological resources, please refer to the section entitled "Potential Archeological Resources." SMALL-SCALE UTILITY STRUCTURES: This project proposes to replace existing and install new lifting stations, wells, and small-scale features associated with the underground utilities, including sanitary sewer manholes, air valves, water meters, sewer meters, electrical meters, fire hydrants, fiber-optic splice boxes, pressure relief valves, and staging areas. TREES: This project will require the removal of trees in association with the installation of underground utilities. The tree removal was designed in close consultation with the NPS Historic Landscape Architect to avoid effects to the cultural landscape. Designs within the cabin camps include narrow, zig-zagging routes that largely align with existing roadways, intended to limit visual impacts associated with tree removal. This project will have no significant impact on the historic district.</p>
Cultural Prehistoric/historic structures <i>Catoctin Mountain Park Visitor Center</i>	Potential	<p>Issue: The park proposes to install a fiber optic cable on exterior and interior surfaces of Catoctin Mountain Park Visitor Center, a building managed by the NPS as contributing to the Catoctin Mountain Park Historic District. At the time the nomination was prepared, park resources associated with the Mission 66 Era was not evaluated for National Register eligibility. Subsequently the Visitor Center, which was significantly updated during the Mission 66 period, is identified as non-contributing to the historic district. In 2022, the park will update the existing nomination to evaluate Mission 66-related resources. Until this project is complete, the park is managing the Visitor Center as contributing to the district. The building was originally constructed by the NPS as the Catoctin RDA Headquarters and Visitor Contact Station in</p>

Resource	Potential for Impact	Potential Issues & Impacts
		<p>1941. In 1965, eleven years after the park unit was re-named Catoctin Mountain Park, the NPS re-modeled the building to expand the headquarters in alignment with NPS Mission 66 initiatives. To connect fiber optic cable to offices and public spaces, this project proposes to affix a fiber optic cable conduit against the west exterior elevation of a wood-framed storage room, a 1990s addition to the building. The conduit will be installed adjacent to existing utilities and will largely be screened by existing utilities. The conduit will pierce the 1990s addition and route through the attic to connect with the communications room on the east end of the building. See attached photographs for more information. The fiber optic cable is composed of PVC or HPDE Conduit, 2" in diameter, and painted to match the existing colors of the walls.</p> <p>Impact: No significant impact. The installation of the conduit on a small portion of a non-historic addition on the rear of the building will not compromise the qualities that make the building contributing to the Catoctin Mountain Park Historic District. The conduit, 2" in diameter, will be installed in areas adjacent to existing utilities. The conduit will be painted to match the paint colors it runs alongside on the exterior and interior. On the interior, the conduit will largely not be seen, as it will run above the dropped ceiling along with other infrastructure.</p>
Cultural Prehistoric/historic structures <i>Ike Smith Pumphouse</i> <i>(Building 62)</i>	Potential	<p>Issue: Constructed in 1938 to support the Catoctin RDA, the Ike Smith Pumphouse (recognized in the design documents as the "Ike Smith Booster Station") is identified in the 2014 National Register Nomination for Catoctin Mountain Park as contributing to the historic district. This pumphouse has been used by the park as a pumphouse since its construction. In association with the centralization of the park's utilities, the park proposes to discontinue using the pumphouse as part of its utility system. The park intends on mothballing the building until determining its future use.</p> <p>Impact: No significant impact. While the pumphouse will no longer be used for its original purpose, this project will not compromise the building's historic integrity. The park plans to temporarily mothball the building in accordance with "NPS Preservation Brief #31 - Mothballing Historic Buildings" until determining the future use of the building. As future projects develop, the park will initiate a separate PEPC entry and SHPO/THPO consultation effort.</p>
Cultural Prehistoric/historic structures <i>Jim Brown Pumphouse</i> <i>(Building 174)</i>	Potential	<p>Issue: The park proposes to rehabilitate the Jim Brown Pumphouse (identified in the design documents as the "Jim Brown Well House No. 1"). This project proposes to replace the existing mono-sloped, rolled asphalt roof and 15' sq skylight with a new, removable, mono-sloped, standing-seam metal roof. The extant vinyl fascia will be replaced with wood. This project also includes the in-kind replacement of the exterior door, frame, and hardware with heavy-duty hollow metal door and stainless-steel frame, matching the existing in measurements and finish. This project also includes the replacement of equipment on the interior of the building, including piping, heating, and well components. This building was constructed in 1966 by the Job Corps. This building is identified as non-contributing in the 2014 National Register Nomination</p>

Resource	Potential for Impact	Potential Issues & Impacts
		<p>for Catoctin Mountain Park. In 2022, the NPS will update its nomination to evaluate Mission 66 and Job Corps Era resources. Until this project is complete, the NPS is managing this building as contributing to the district. Historically, the roof of the Jim Brown Well House was constructed of a composition shingle roof, wood ceiling, and wood trim. At an unknown date after the Job Corps Era, the wood trim and soffit were replaced with white vinyl.</p> <p>Impact: No significant impact. The change in roofing material from rolled asphalt to standing seam metal will not be visible from the ground level and will therefore not compromise the integrity of the mid-century building.</p>
Geological Geologic Features	None	
Geological Geologic Processes	None	
Lightscares Lightscares	None	
Other Human Health and Safety	None	
Socioeconomic Land Use	None	
Socioeconomic Minority and low-income populations, size, migration patterns, etc.	None	
Socioeconomic Socioeconomic	None	
Soundscapes Soundscapes <i>Sounds Produced During Construction</i>	Potential	<p>Issue: During construction, crews will generate sounds associated with trenching equipment and other machinery.</p> <p>Impact: No significant impact. These sounds will be temporary, just for the duration of the project.</p>
Viewsheds Viewsheds	None	
Visitor Use and Experience Recreation Resources <i>Recreation Opportunities</i>	Potential	<p>Issue: The construction portion of this project may impact the visitor experience, as it may require temporary road closures or partial park closures for the duration of the work.</p> <p>Impact: No significant impact. These closures will be temporary in nature and will not have long-term impacts to the visitor experience.</p>

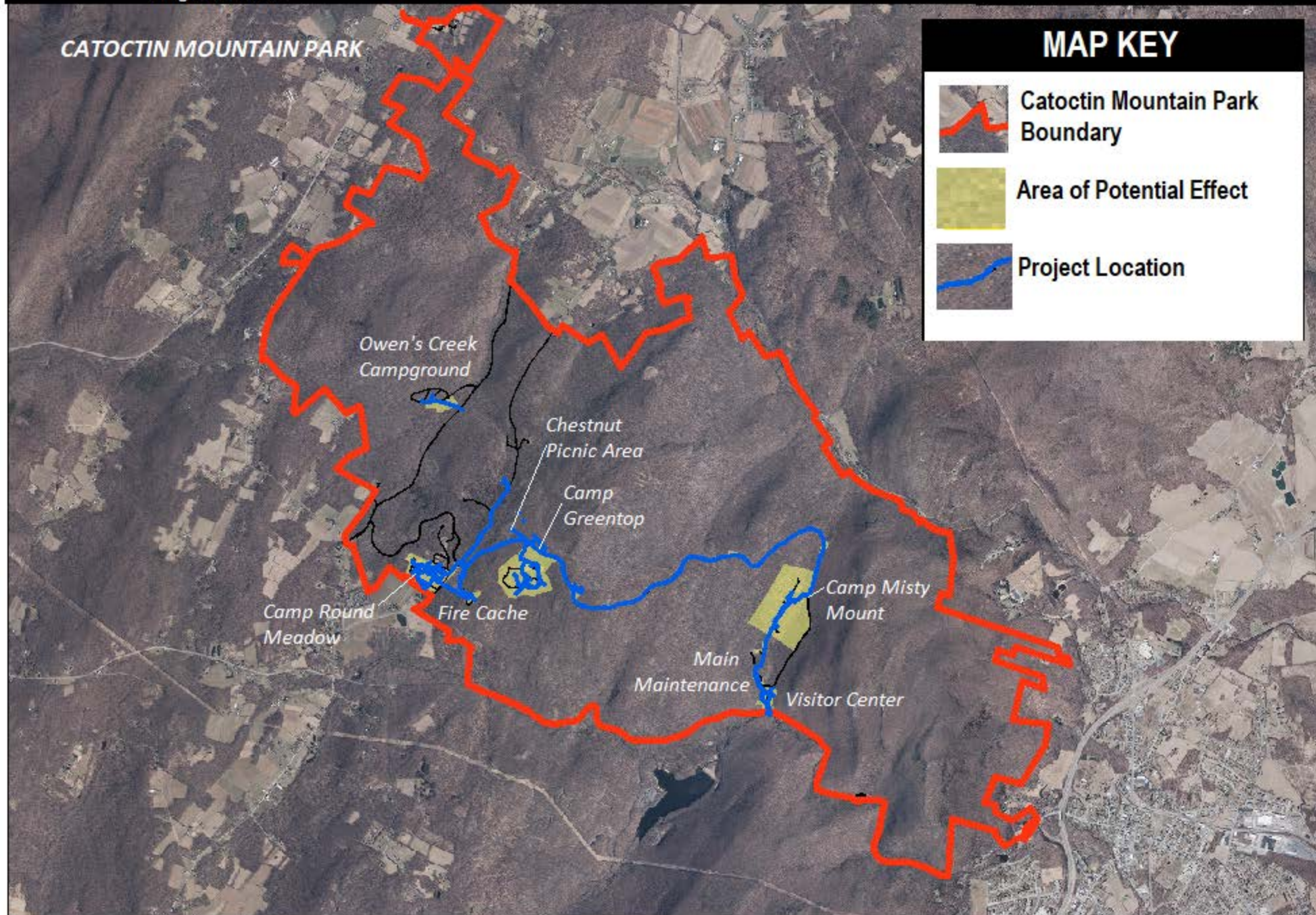
Resource	Potential for Impact	Potential Issues & Impacts
Visitor Use and Experience Visitor Use and Experience <i>Visitor Use and Experience</i>	Potential	<p>Issue: The construction portion of this project may impact the visitor experience, as it may require temporary road closures or partial park closures for the duration of the work.</p> <p>Impact: No significant impact. These closures will be temporary in nature and will not have long-term impacts to the visitor experience.</p>
Water Floodplains <i>Owens Creek Floodplain</i>	Potential	<p>Issue: Utility lines will cross Owens Creek, and floodplain near the Owens Creek Campground.</p> <p>Impact: No significant impact. Directional boring under the stream would decrease impacts to the area. Minimizing tree removal would also lessen impact. If trenching needs to be done, it will be a short-term impact.</p>
Water Marine or Estuarine Resources <i>Owens Creek</i>	Potential	<p>Issue: Fish and invertebrates and thier habitats could be disturbed and/or trampled by utility line installation across Owens Creek near the Owens Creek Campground.</p> <p>Impact: No significant impact. Silt could effect trout spawning so in-stream work is prohibited from October through April. Directional boring under the stream would impact the resources less. Minimizing tree removal would also lessen impact. If trenching needs to be done, it will be a short-term impact. Silt control measures will have to be followed.</p>
Water Water Quality or Quantity <i>Owens Creek</i>	Potential	<p>Issue: Silt from utility work could effect stream water quality.</p> <p>Impact: No significant impact. Silt could effect trout spawning so stream work is prohibited from October through April. Directional boring under the stream would impact the water quality less. Minimizing tree removal would also lessen impact. If trenching needs to be done, it will be a short-term impact. Silt control measures will have to be followed.</p>
Water Wetlands <i>Owens Creek Wetland</i>	Potential	<p>Issue: Owens Creek Wetland is a wetland of state concern. There are several listed rare plants within the area. Utility lines will cross Owens Creek near Owens Creek Campground. The area will be disturbed and plants trampled.</p> <p>Impact: No significant impact. Directional boring under the stream would impact the area less. Minimizing tree removal would also lessen impact. If trenching needs to be done, it will be a short-term impact. Rare plants will be surveyed for and avoided.</p>
Wilderness Wilderness	None	

D. ESF ADDENDUM QUESTIONS:

Question	Answer	Notes



OVERALL PROJECT LOCATION
PEPC 88406: Replace Parkwide Infrastructure
Catoctin Mountain Park
August 2021



0 3,300 6,600 13,200 Feet



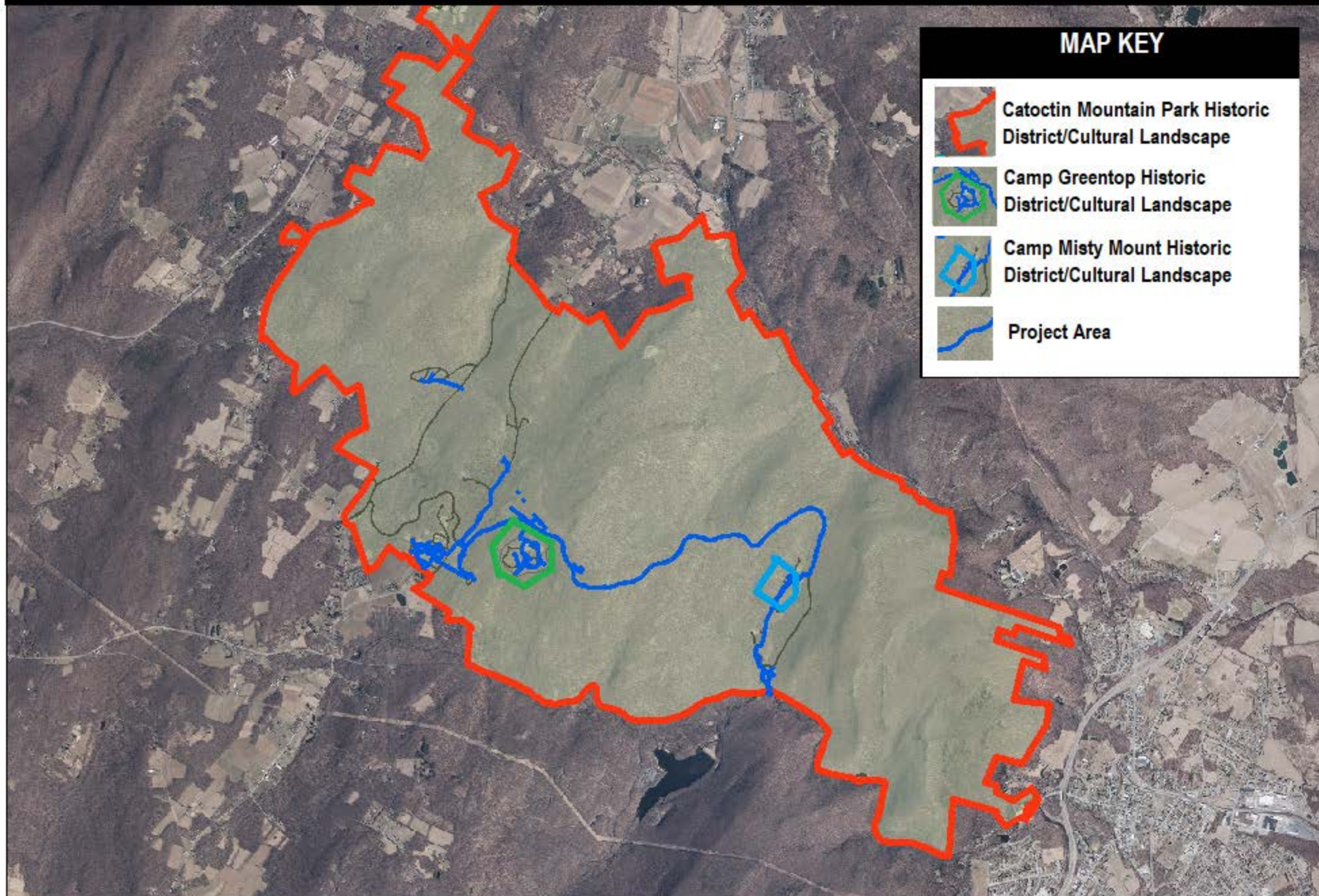


HISTORIC DISTRICTS AND CULTURAL LANDSCAPES

PEPC 88406: Replace Parkwide Utility Infrastructure

Catoctin Mountain Park

August 2021



MAP KEY

-  Catoctin Mountain Park Historic District/Cultural Landscape
-  Camp Greentop Historic District/Cultural Landscape
-  Camp Misty Mount Historic District/Cultural Landscape
-  Project Area

0 3,300 6,600 13,200 Feet



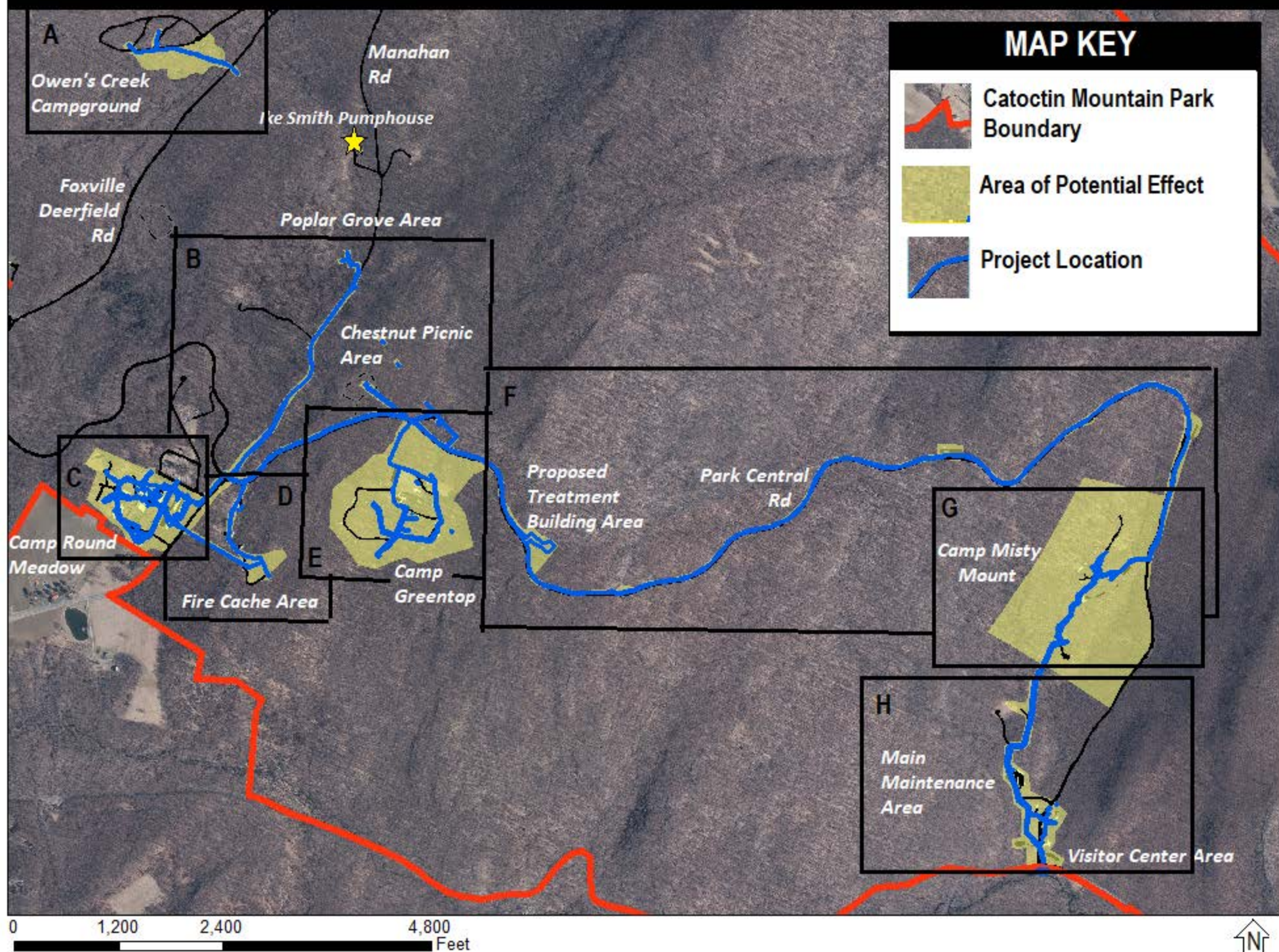


OVERALL AREA OF POTENTIAL EFFECT & PROJECT AREA

August 2021

PEPC 88406: Replace Parkwide Utility Infrastructure

Catoctin Mountain Park



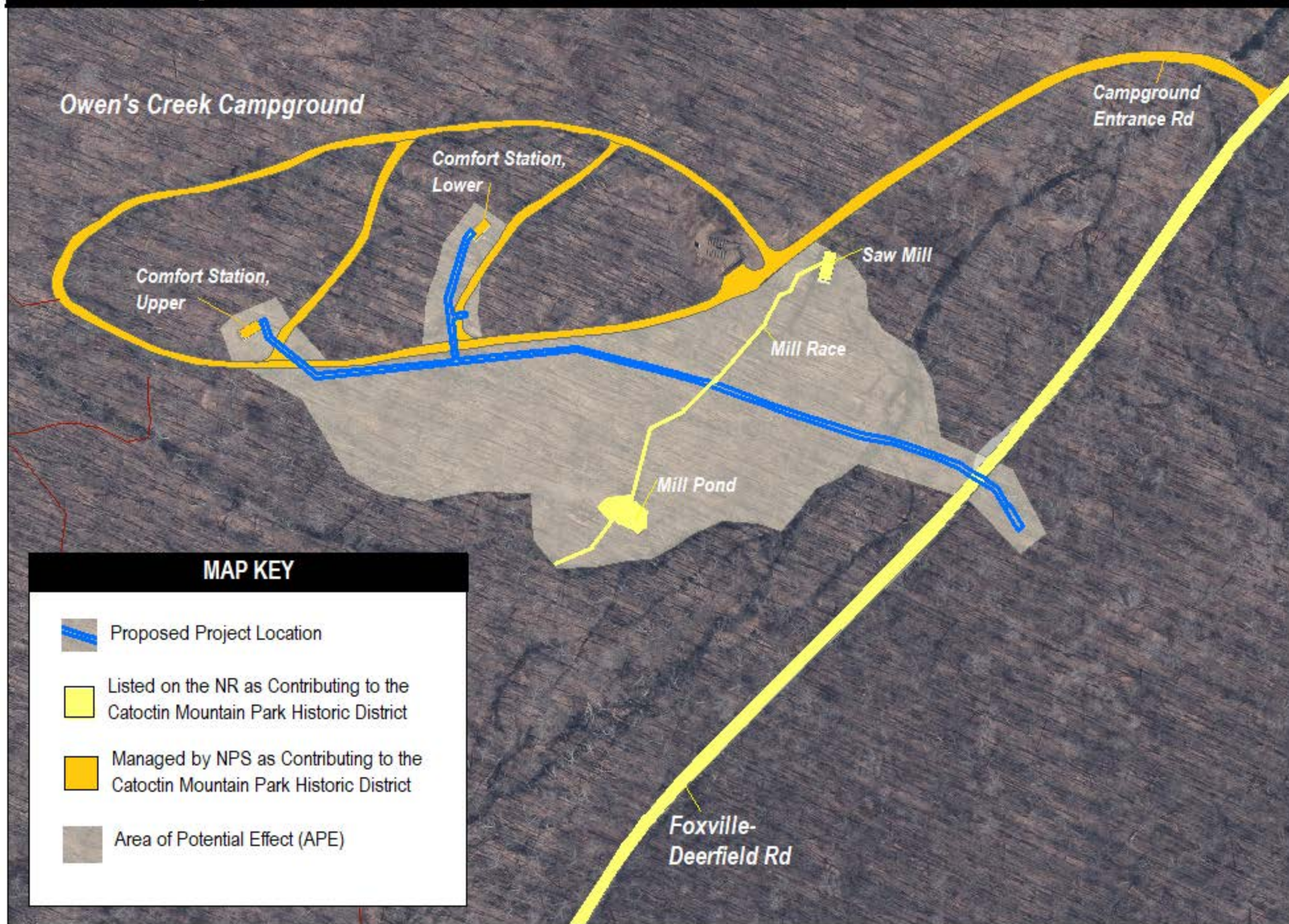


SITE MAP A





PEPC 88406: Replace Parkwide Utility Infrastructure

Catoctin Mountain Park

August 2021



MAP KEY

-  Proposed Project Location
-  Listed on the NR as Contributing to the Catoctin Mountain Park Historic District
-  Managed by NPS as Contributing to the Catoctin Mountain Park Historic District
-  Area of Potential Effect (APE)

0 175 350 700 Feet



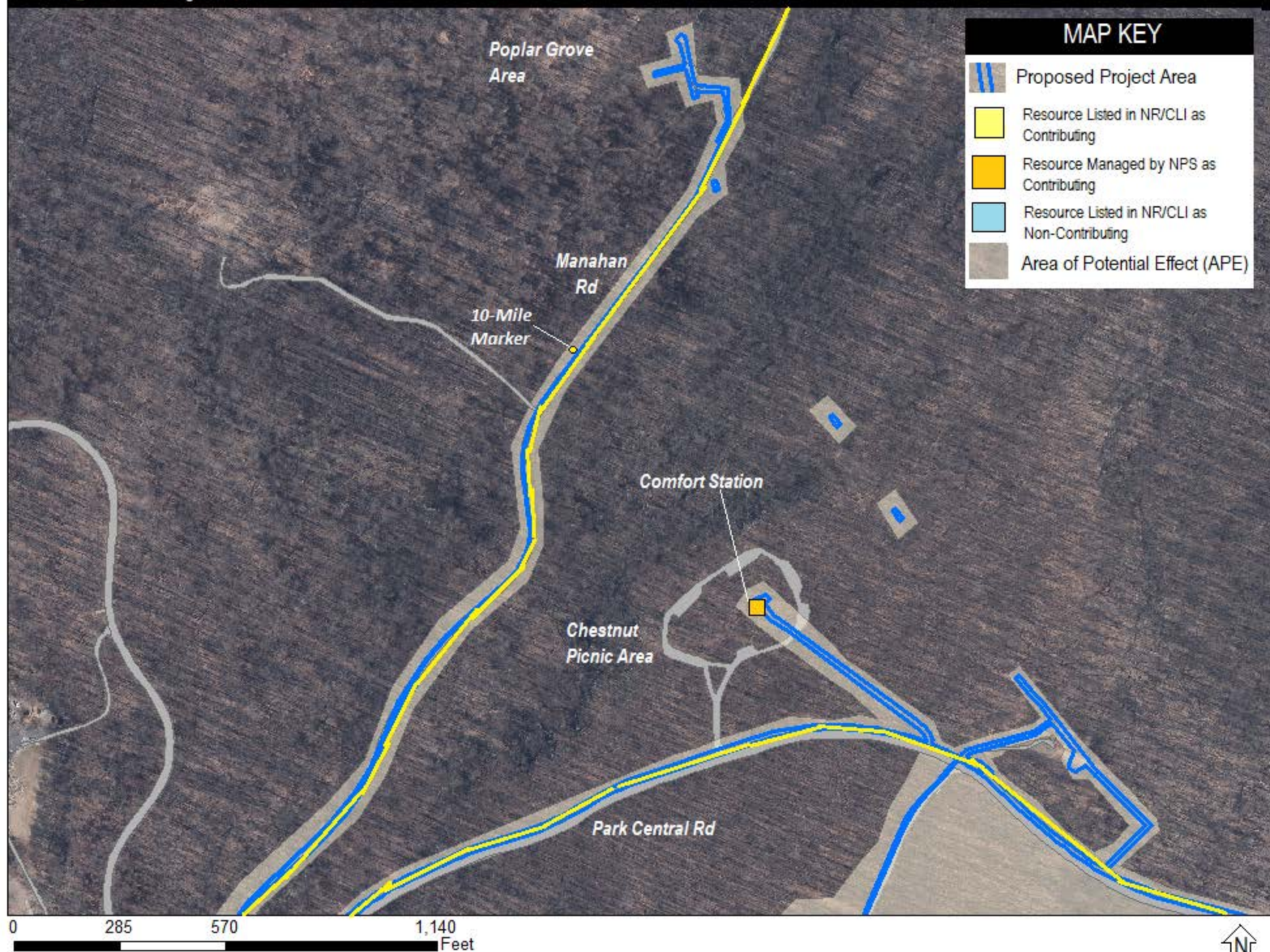


SITE MAP B

PEPC 88406: Replace Parkwide Utility Infrastructure

Catoctin Mountain Park

August 2021





SITE MAP C

PEPC 88406: Replace Parkwide Utility Infrastructure

Catoctin Mountain Park

August 2021





SITE MAP D

PEPC 88406: Replace Parkwide Utility Infrastructure

Catoctin Mountain Park

August 2021



MAP KEY

- Proposed Project Area
- Resource Listed in NR/CLI as Contributing
- Resource Managed by NPS as Contributing
- Resource Listed in NR/CLI as Non-Contributing
- Area of Potential Effect (APE)

- 1. Fire Cache Building
- 2. Water Treatment Building
- 3. Lumber Shed
- 4. Storage
- 5. Fire Wood Shed
- 6. Jim Brown Pumphouse

0 140 280 560 Feet











SITE MAP E

PEPC 88406: Replace Parkwide Utility Infrastructure

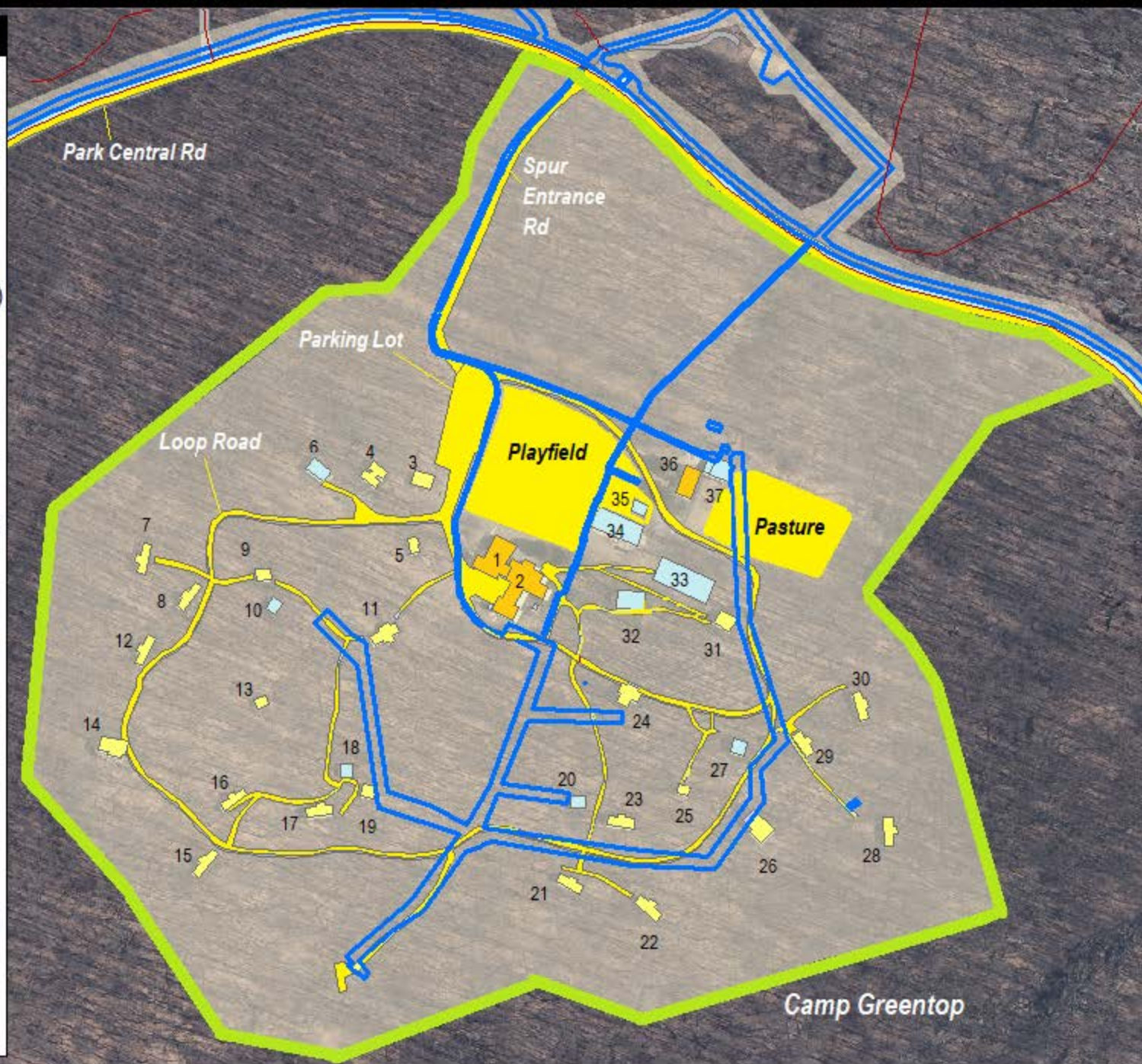
Catoctin Mountain Park

August 2021

MAP KEY

-  Proposed Project Area
-  Resource Listed in NR/CLI as Contributing
-  Resource Managed by NPS as Contributing
-  Resource Listed in NR/CLI as Non-Contributing
-  Area of Potential Effect (APE)
-  Boundaries of Camp Greentop Historic District

- | | |
|-----------------------|---------------------|
| 1 Recreation Hall | 28 Unit D Cabin 3 |
| 2 Dining Hall | 29 Unit D Cabin 2 |
| 3 Camp Office | 30 Unit D Cabin 1 |
| 4 Storage Building | 31 Crafts Shop |
| 5 Help's Cabin | 32 Central Shower |
| 6 Storage Shed | 33 Basketball Court |
| 7 Unit A Cabin 2 | 34 Swimming Pool |
| 8 Unit A Cabin 1 | 35 Playground |
| 9 Latrines A | 36 Stable Office |
| 10 Comfort Stations A | 37 Stable |
| 11 Infirmary | |
| 12 Unit A Cabin 3 | |
| 13 Leader's Cabin | |
| 14 Lodge | |
| 15 Unit B Cabin 1 | |
| 16 Unit B Cabin 2 | |
| 17 Unit B Cabin 3 | |
| 18 Comfort Station B | |
| 19 Latrines B | |
| 20 Comfort Stations C | |
| 21 Unit C Cabin 2 | |
| 22 Unit C Cabin 3 | |
| 23 Unit C Cabin 1 | |
| 24 Staff Quarters | |
| 25 Leader's Cabin | |
| 26 Good Luck Lodge | |
| 27 Comfort Stations D | |



0 210 420 840 Feet



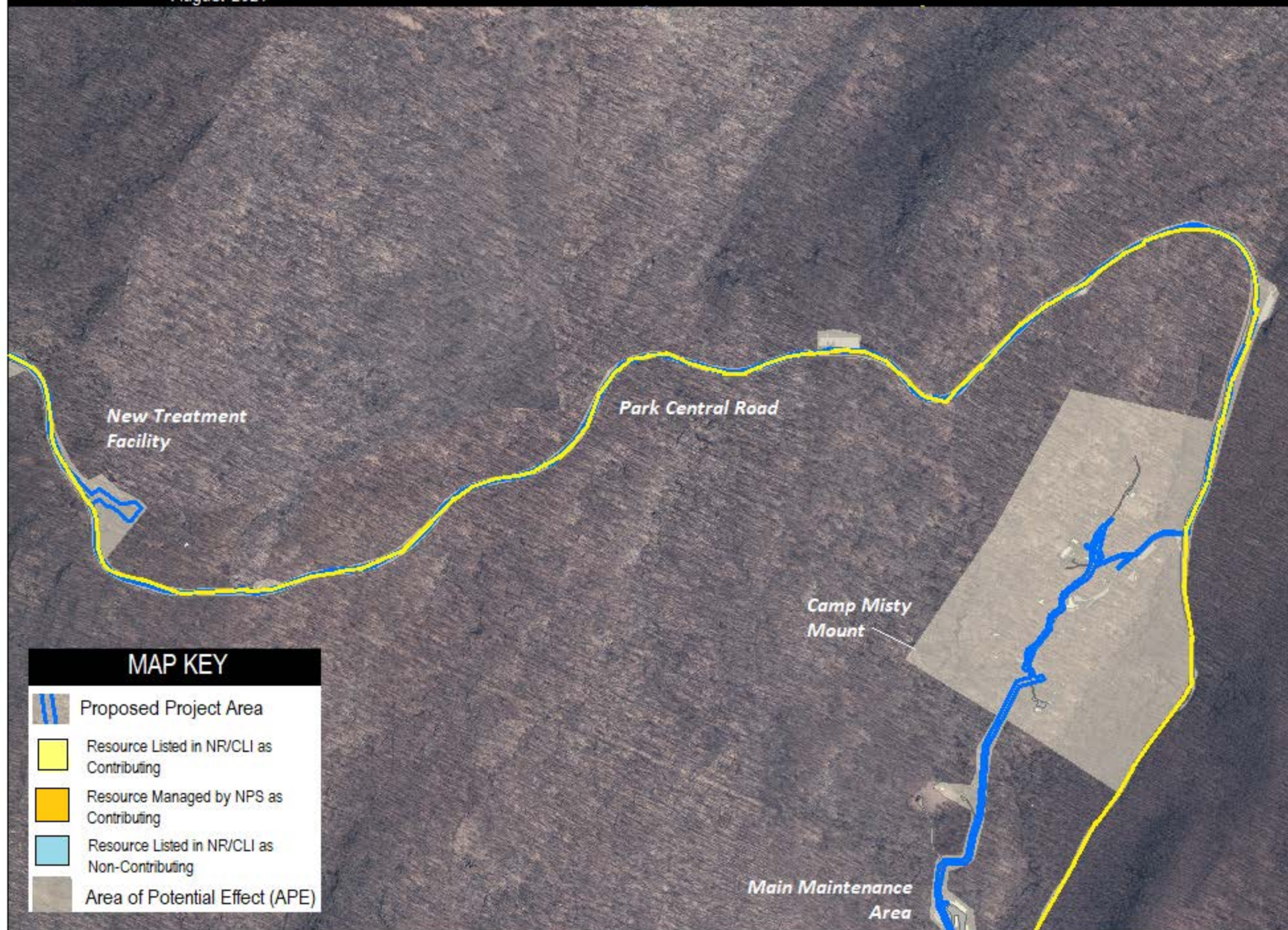


SITE MAP F






PEPC 88406: Replace Parkwide Utility Infrastructure

Catoctin Mountain Park

August 2021



MAP KEY

-  Proposed Project Area
-  Resource Listed in NR/CLI as Contributing
-  Resource Managed by NPS as Contributing
-  Resource Listed in NR/CLI as Non-Contributing
-  Area of Potential Effect (APE)

0 700 1,400 2,800 Feet





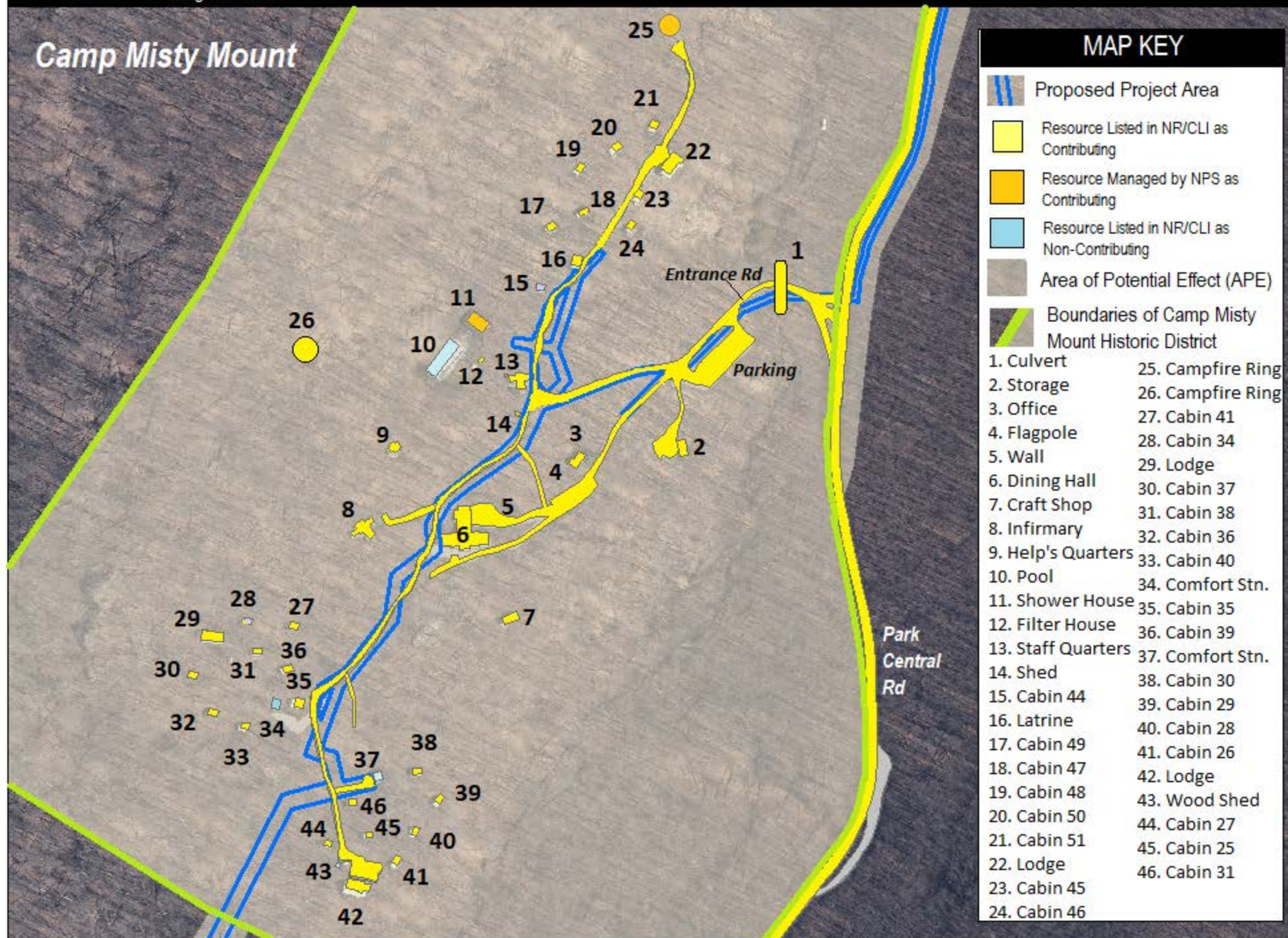
SITE MAP G

PEPC 88406: Replace Parkwide Utility Infrastructure

Catoctin Mountain Park

August 2021

Camp Misty Mount



MAP KEY

- Proposed Project Area
- Resource Listed in NR/CLI as Contributing
- Resource Managed by NPS as Contributing
- Resource Listed in NR/CLI as Non-Contributing
- Area of Potential Effect (APE)
- Boundaries of Camp Misty Mount Historic District

- | | |
|--------------------|-------------------|
| 1. Culvert | 25. Campfire Ring |
| 2. Storage | 26. Campfire Ring |
| 3. Office | 27. Cabin 41 |
| 4. Flagpole | 28. Cabin 34 |
| 5. Wall | 29. Lodge |
| 6. Dining Hall | 30. Cabin 37 |
| 7. Craft Shop | 31. Cabin 38 |
| 8. Infirmary | 32. Cabin 36 |
| 9. Help's Quarters | 33. Cabin 40 |
| 10. Pool | 34. Comfort Stn. |
| 11. Shower House | 35. Cabin 35 |
| 12. Filter House | 36. Cabin 39 |
| 13. Staff Quarters | 37. Comfort Stn. |
| 14. Shed | 38. Cabin 30 |
| 15. Cabin 44 | 39. Cabin 29 |
| 16. Latrine | 40. Cabin 28 |
| 17. Cabin 49 | 41. Cabin 26 |
| 18. Cabin 47 | 42. Lodge |
| 19. Cabin 48 | 43. Wood Shed |
| 20. Cabin 50 | 44. Cabin 27 |
| 21. Cabin 51 | 45. Cabin 25 |
| 22. Lodge | 46. Cabin 31 |
| 23. Cabin 45 | |
| 24. Cabin 46 | |

0 210 420 840 Feet










SITE MAP H

PEPC 88406: Replace Parkwide Utility Infrastructure

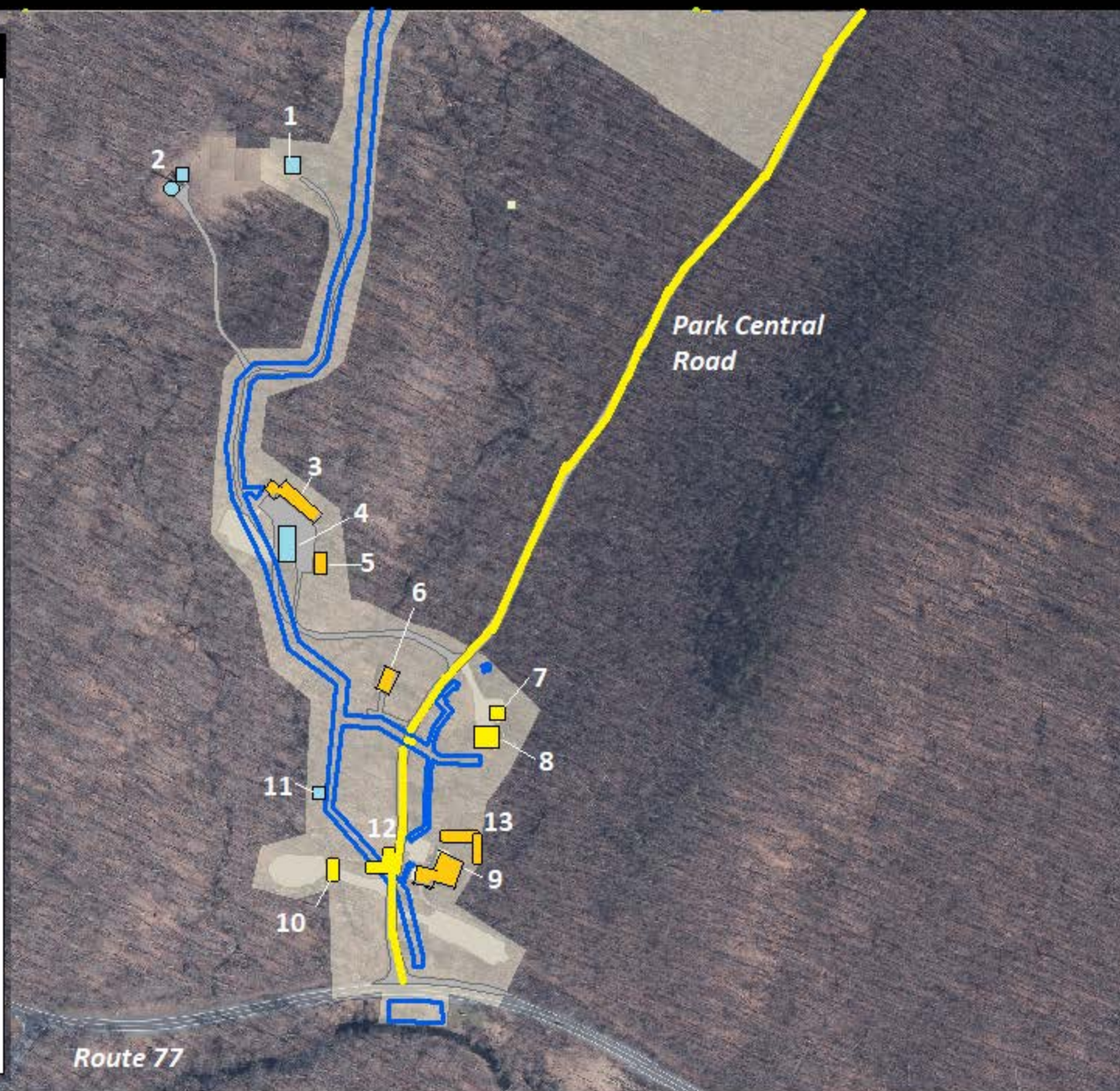
Catoctin Mountain Park

August 2021

MAP KEY

-  Proposed Project Area
-  Resource Listed in NR/CLI as Contributing
-  Resource Managed by NPS as Contributing
-  Resource Listed in NR/CLI as Non-Contributing
-  Area of Potential Effect (APE)

1. Blue Blazes Well House No. 2
2. Telecommunications Tower
3. Maintenance Shop
4. Vehicle Shed
5. Sign Shed
6. Building 167 (Quarters 6)
7. Quarters 1 Garage
8. Quarters 1
9. Visitor Center
10. Stone Headwalls
11. Blue Blazes Well House No. 1
12. Stone Walls
13. Retaining Walls



0 280 560 1,120 Feet



PHOTOGRAPHS

PEPC 88406: Replace Parkwide Utility Infrastructure

Catoctin Mountain Park

December 18, 2020



Photograph 1. Proposed location for the new centralized treatment building and water storage tank.



Photograph 2. View of proposed location for centralized treatment building and water storage tank from Park Central Road.



Photograph 3.Existing conditions of the water storage tank s that services Camp Round Meadow. The park proposes to decommission and/or demolish this and four other similar tanks, and level the mound to ground level.



Photograph 4. View of the Jim Brown Well House No. 1. The park proposes to rehabilitate this building in an effort to improve utility maintenance.



Photograph 5. Interior view of the Jim Brown Well House, with detail of Jim Brown Well No. 1. The park proposes to rehabilitate a total of four wells throughout the park to improve efficiency of utility systems.



Photograph 6. View of Jim Brown Well No. 2. The park proposes to rehabilitate a total of four wells throughout the park to improve efficiency of utility systems.



Photograph 7. View looking north down Park Central Road. The park proposes to replace the existing water line that runs along the entire eastern (which becomes northern) edge of the road.



Photograph 8. View looking south along route of proposed underground utility work, which follows the path of the gravel road. Camp Misty Mount Cabin No. 35 in background.



Photograph 9. View toward proposed location of underground water utility work, which runs along the buildings in this photograph. Featured in the background are the Resource Management Office (left) and Central Garage (right) at Camp Round Meadow.



Photograph 10. View of the Camp Round Meadow Sewer Lift Station. The park proposes to either rehabilitate or replace, in-kind, this lift station.



Photograph 11. View of the Camp Greentop Sewer Lift Station. The park proposes to rehabilitate this lift station.



Photograph 12.View of Camp Round Meadow Transformer 4 (center). The park proposes to replace this and many other small-scale utility features in-kind.



Photograph 13. View of one of the Camp Round Meadow fire hydrants (right). The park proposes to rehabilitate all fire hydrants in the park.



Photograph 14. View of the Ike Smith Booster Station, which is currently active. The park proposes to abandon this building, in-place, without making any physical changes to the building.



Photograph 15. View of the Blue Blazes Well House No. 1, which is currently active. The park proposes to abandon this building, in-place, without making any physical changes to the building.



Photograph 16. View within the Camp Misty Mount Historic District/Cultural Landscape.



Photograph 17. View within the Camp Greentop Historic District/Cultural Landscape, featuring the Mission 66 Dining Hall/Recreation Hall.



Photograph 18. View within the Camp Greentop Historic District/Cultural Landscape, featuring Cabin No. 57.



Photograph 19. View within the Camp Round Meadow, a developed area within the Catoctin Mountain Park Historic District, featuring the Blacksmith Shop (foreground) and the Oil House (background).

FIGURES

Install Fiber Optic Cable in Camp Round Meadow Gym and Park Visitor Center

PEPC 88406: Replace Parkwide Utility Infrastructure

Catoctin Mountain Park

May 21, 2021



Figure 1. View looking southwest toward Camp Round Meadow Gym, where the park proposes to install a fiber optic cable (Photographer: NPS/K. Wackrow; Date: 4/21/21).



Figure 2. The park proposes to affix the fiber optic cable on the east elevation of the Gym. This area is screened from view by a fence. The dotted line represents the conduit beneath the ground and the solid line represents the conduit above ground, against the building (Photographer: Jacobs/R. Harte; Date: 4/1/21).



Figure 3. View of east elevation of the Gym, indicating route of fiber optic cable on the building exterior (Photographer: Jacobs/R. Harte; Date: 4/1/21).



Photograph 4. View of the interior hall of the Gym, indicating the route of proposed fiber optic cable alongside existing cables (Photographer: Jacobs/R. Harte; Date: 4/1/21).



Figure 5. View of the inside of the communications room on the interior of the Gym (Photographer: Jacobs/R. Harte; Date: 4/1/21).

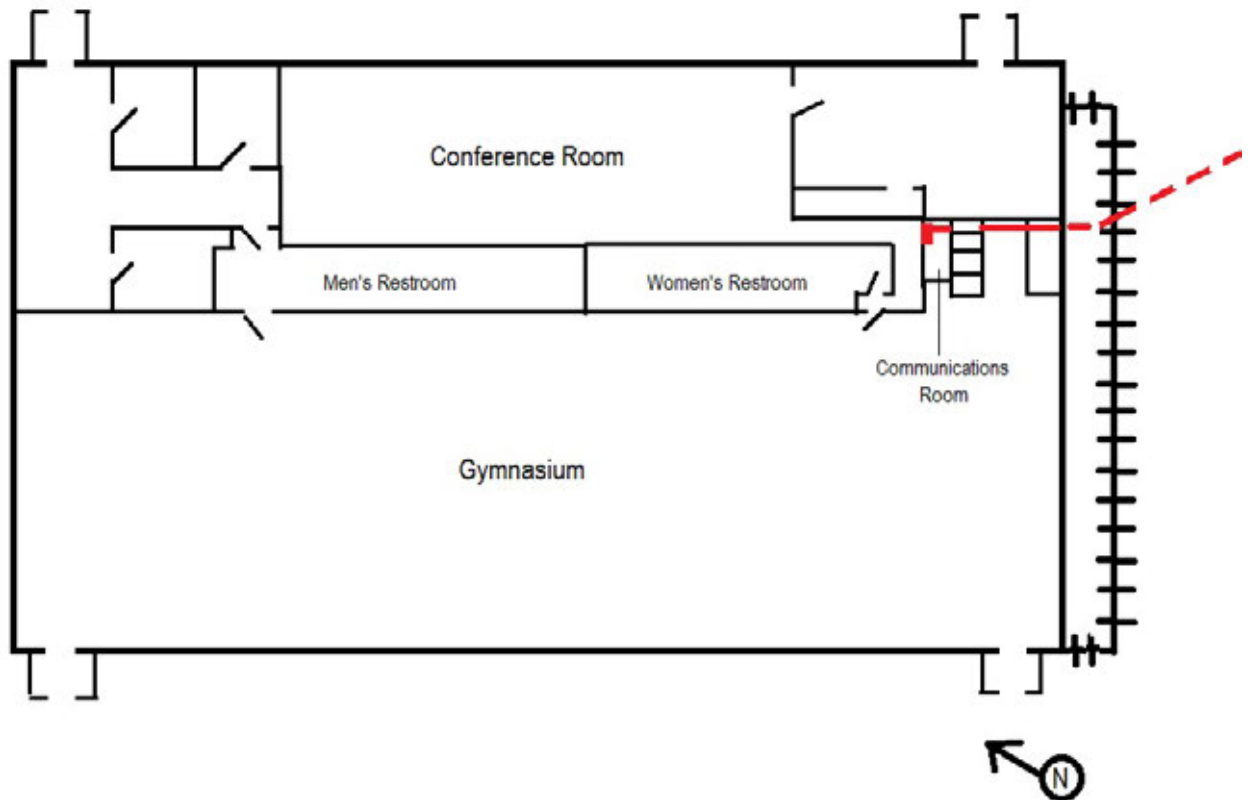


Figure 6. First floor plan of the Gym, illustrating the path the fiber optic cable will take through the building. Dotted lines indicate areas where the line is beneath the ground. Solid lines indicate the conduit above ground (NPS/K. Wackrow; Date: 5/21/21).



Figure 7. View looking northwest of the Catoclin Mountain Park Visitor Center, where the park proposes to install a fiber optic cable (Photographer: NPS/K. Wackrow. Date: 5/21/21).



Figure 8. Route of fiber optic cable through the Catoclin Mountain Park Visitor Center. Dashed lines indicate areas where the cable is underground. Solid lines and box represent features proposed to be installed on the exterior of the building (Photographer: NPS/K. Wackrow; Date: 5/21/21).



Figure 9. View of interior of storage room, where the fiber optic cable would enter the Visitor Center (Photographer: NPS/K. Wackrow; Date: 5/19/21).



Figure 10. View of interior of storage room, where the fiber optic cable runs along the walls (Photographer: NPS/K. Wackrow; Date: 5/19/21).



Figure 11. View of interior of storage room, where fiber optic cable would run alongside existing utility lines and pierce the ceiling to enter the attic space (Photographer: NPS/K. Wackrow; Date: 5/21/21).



Figure 12. View of interior of attic space, where the fiber optic cable would run through until it's above the communications room on the southern end of the building (Photographer: NPS/K. Wackrow; Date: 5/21/21).

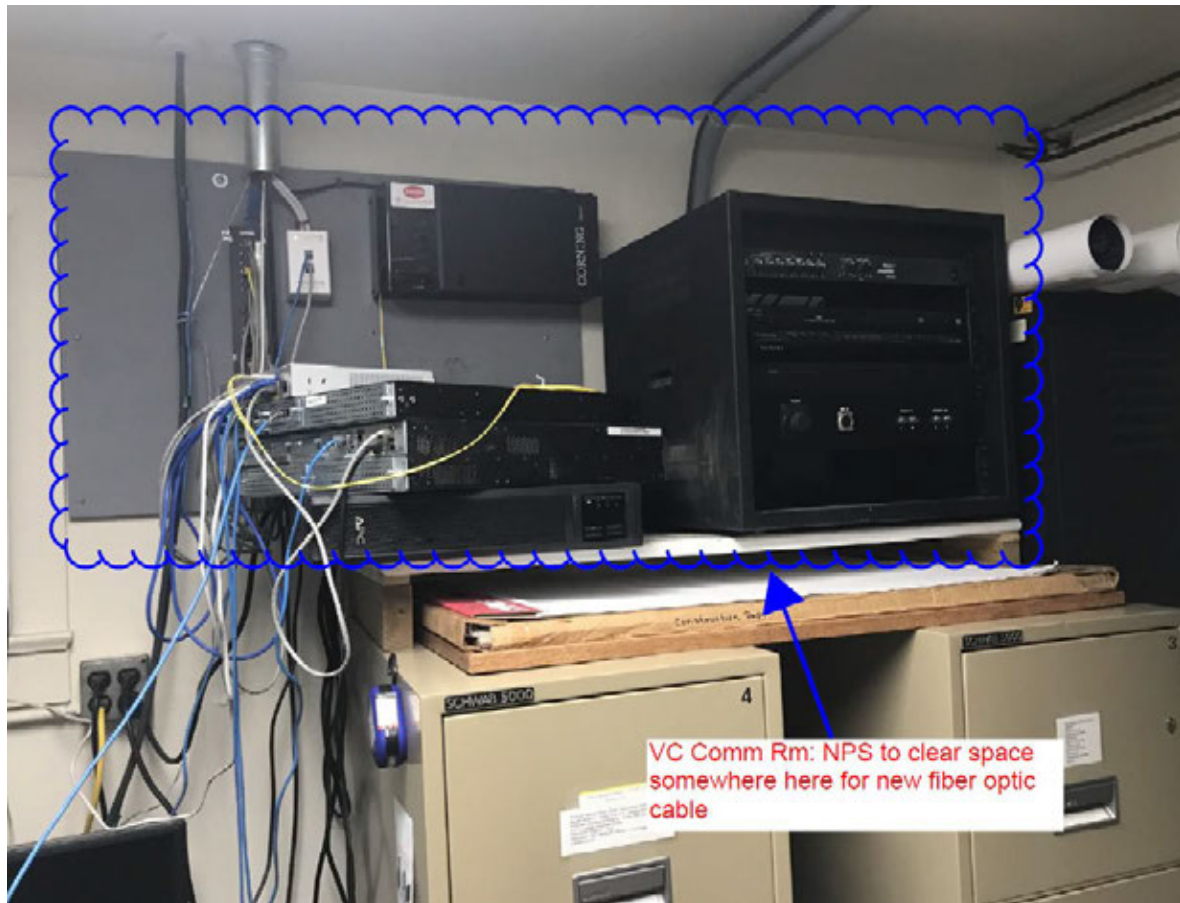


Figure 13. View of interior of communications room, where the fiber optic cable will terminate (Photographer: Jacobs/R. Harte; Date: 4/1/21).

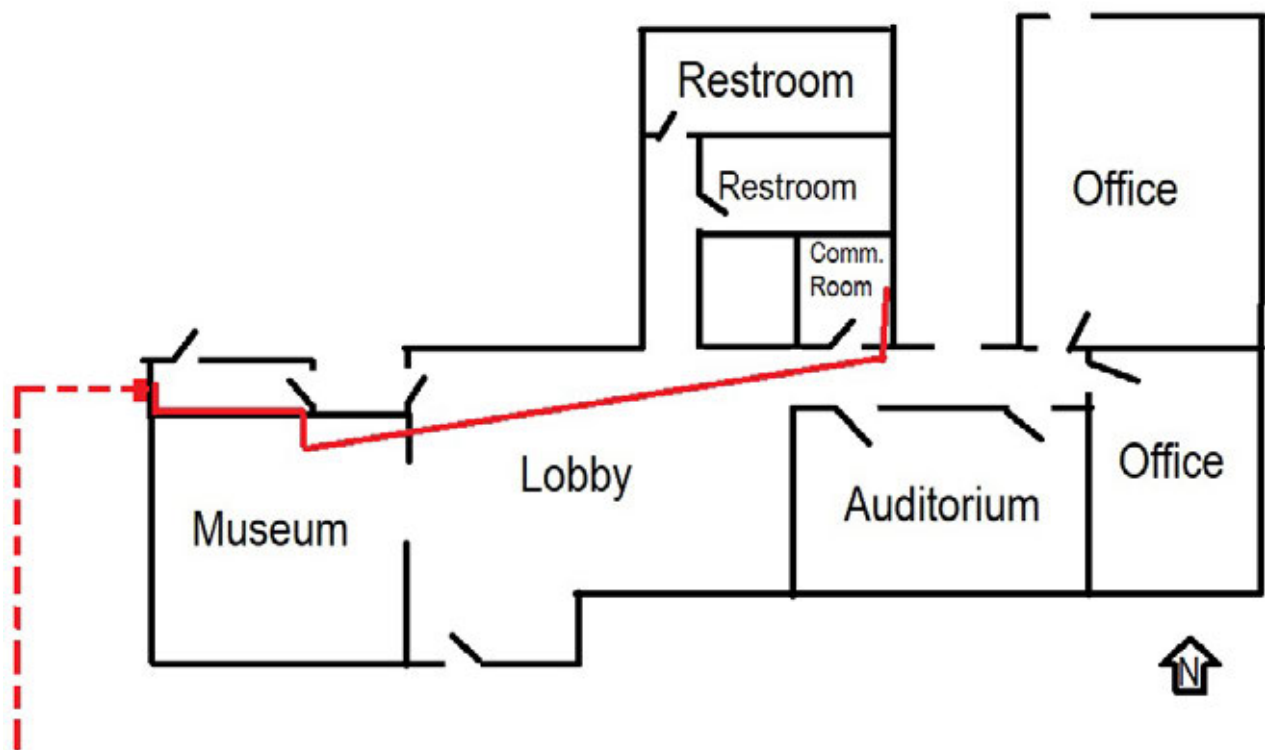


Figure 12. Floor plan of Catoclin Mountain Park Visitor Center, illustrating the path the fiber optic cable will take through the building. The dashed line represents the cable beneath the ground. Solid lines reflect the path the conduit will take through the interior of the building (NPS/K. Wackrow; Date: 5/21/21).