Boston Run - Cuyahoga River Watershed (HUC 041100020405)

Nine-Element Nonpoint Source Implementation Strategic Plan

February 2020

Approved: February 21, 2020

Summit Metro Parks

Summit Ecological CONSULTING

Characterizing the Boston Run-Cuyahoga River watershed, known impairments and causes, and proposed projects wherein attainment goals are discussed.

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1 INTRODUCTION

1.1 REPORT BACKGROUND

This Nine-Element Nonpoint Source Pollution Implementation Strategic Plan (NPS-IS) was created by Summit Ecological Consulting LLC (SEC) with assistance from Summit Metro Parks, The Cuyahoga Valley National Park, and others. As State and Federal nonpoint source funding now relies upon the development of an NPS-IS plan, this NPS-IS plan must be accepted by both the Ohio and United States EPA as meeting the 9-minimum element requirements as outlined in the USEPA's *Handbook for Developing Watershed Plans to Restore and Protect our Waters* [1].

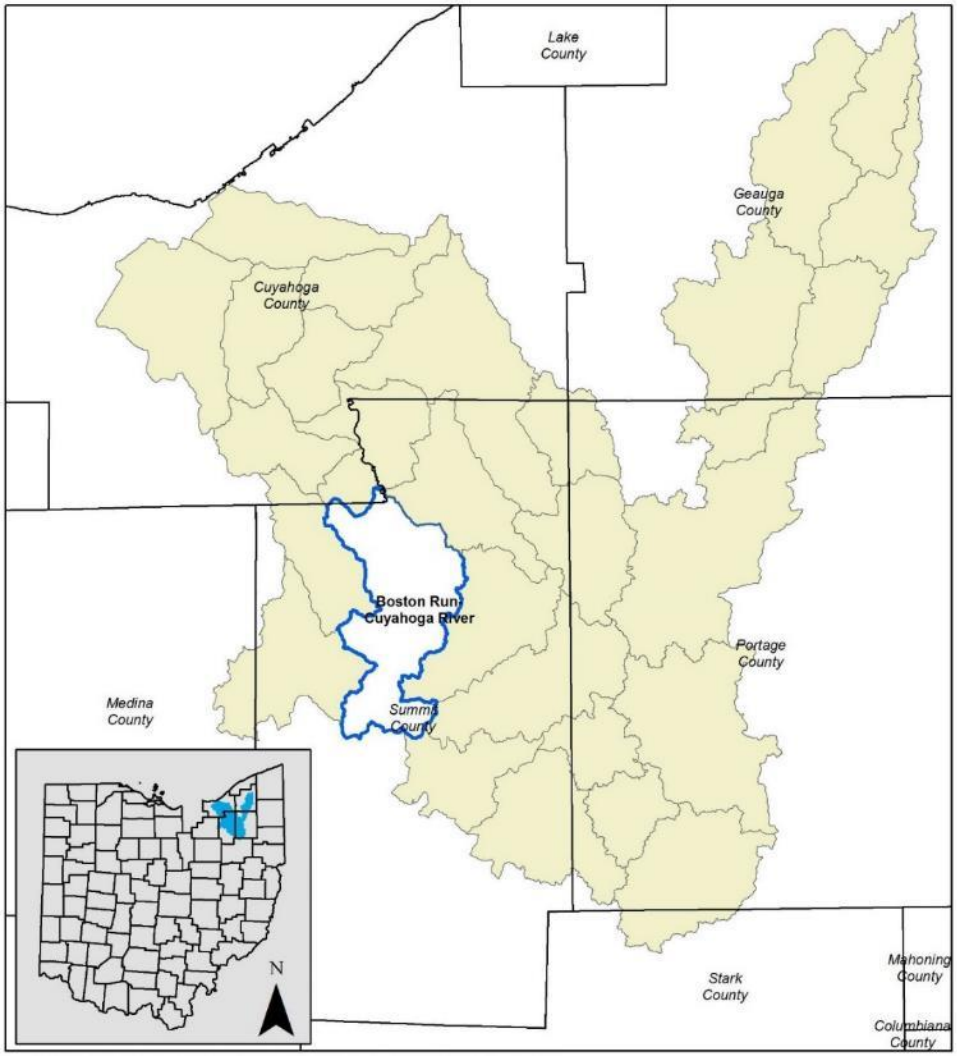

Figure 1: Boston Run-Cuyahoga River Watershed - Location within Cuyahoga River Watershed

1.2 WATERSHED PROFILE AND HISTORY

This implementation document addresses the **Boston Run - Cuyahoga River Watershed (HUC 04110002 04 05).** The largest of the 5 HUC 12 watersheds within the Yellow Creek-Cuyahoga River HUC 10 (0411000204), this watershed has a drainage area of approximately 46.44 square miles (29,721.59 acres) [2] and drains into both the east and west banks of the Cuyahoga River, both in Summit and Cuyahoga Counties. This watershed comprises many primary, named constituent tributaries to the Cuyahoga River; Boston Run, Stanford Run, Haskell Run, Ritchie Run, Salt Run, Dickerson Run, Langes Run, Robinson Run, and Woodward Creek flow into the Cuyahoga River from the eastern side, while Granny's Run, Slipper Run, and Sand Run join from the west. Additional, unnamed streams are also present, contributing to the watershed's drainage area of 46.4 $mi^{2.}$

Image 1: Boston Run at N. Locust Street in Peninsula

The watershed lies within the Erie/Ontario Drift and Lake Plain Ecoregion and was glaciated in the most recent (Wisconsinan) Ice Age. The predominantly level terrain of the Erie/Ontario Drift and Lake Plain Ecoregion is characterized by low lime drift and lacustrine deposits. Multiple water resources such as lakes, wetlands, and streams occur where water networks converge or where the land has flat relief with clay soils. These soils are lower in carbonate and are naturally less fertile than other glaciated ecoregions. Land use is comprised of urban development, industrial activity, and agricultural activities with scattered woodlots. Lake Erie influences climate throughout the region by increasing the growing season, winter cloudiness, and snow accumulations [3] [4] [5].

The Boston Run-Cuyahoga River watershed begins at Cuyahoga River river mile ((RM) 42.27) and extends downstream to the confluence of the Cuyahoga River and Brandywine Creek (RM 24.16), encompassing 18.11 miles of the Cuyahoga River mainstem.

Image 2: Cuyahoga River at Route 303

While the Boston Run-Cuyahoga River watershed encompasses urbanized portions of the cities of Akron and Fairlawn as well as conservation holdings from Summit Metro Parks and Kent State University, the bulk of the watershed lies within the Cuyahoga Valley National Park, and has therefore been protected from many of the threats of urban encroachment long before its establishment as the Cuyahoga Valley National Recreation Area in 1974, a name which would later be changed to the more familiar CVNP in 2000 [6].

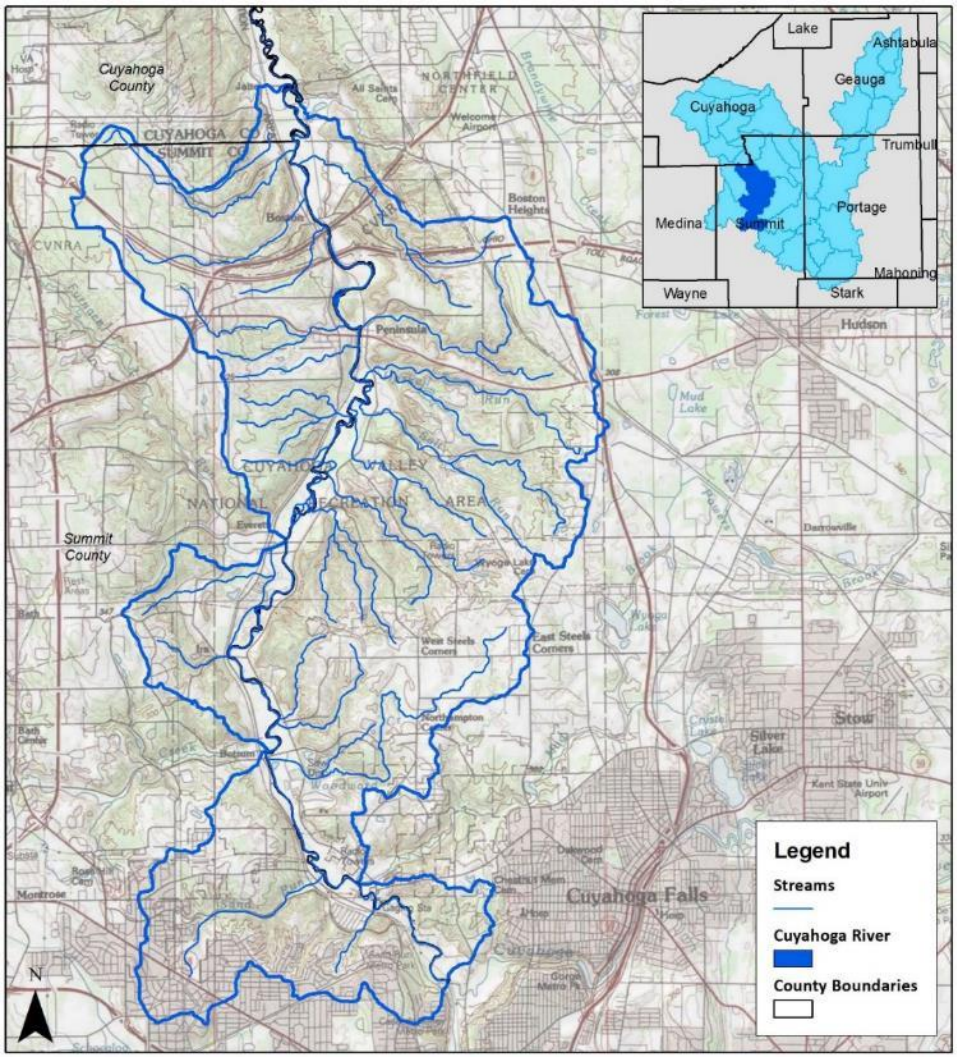

Figure 2: Boston Run-Cuyahoga River Watershed - USGS Map

The Boston Run-Cuyahoga River watershed is a topographically variable watershed, ranging in elevation from approximately 1,180 feet above sea level on the western rim of the Cuyahoga Valley to approximately 640 feet above sea level for the Cuyahoga River at the northernmost extent within the watershed.

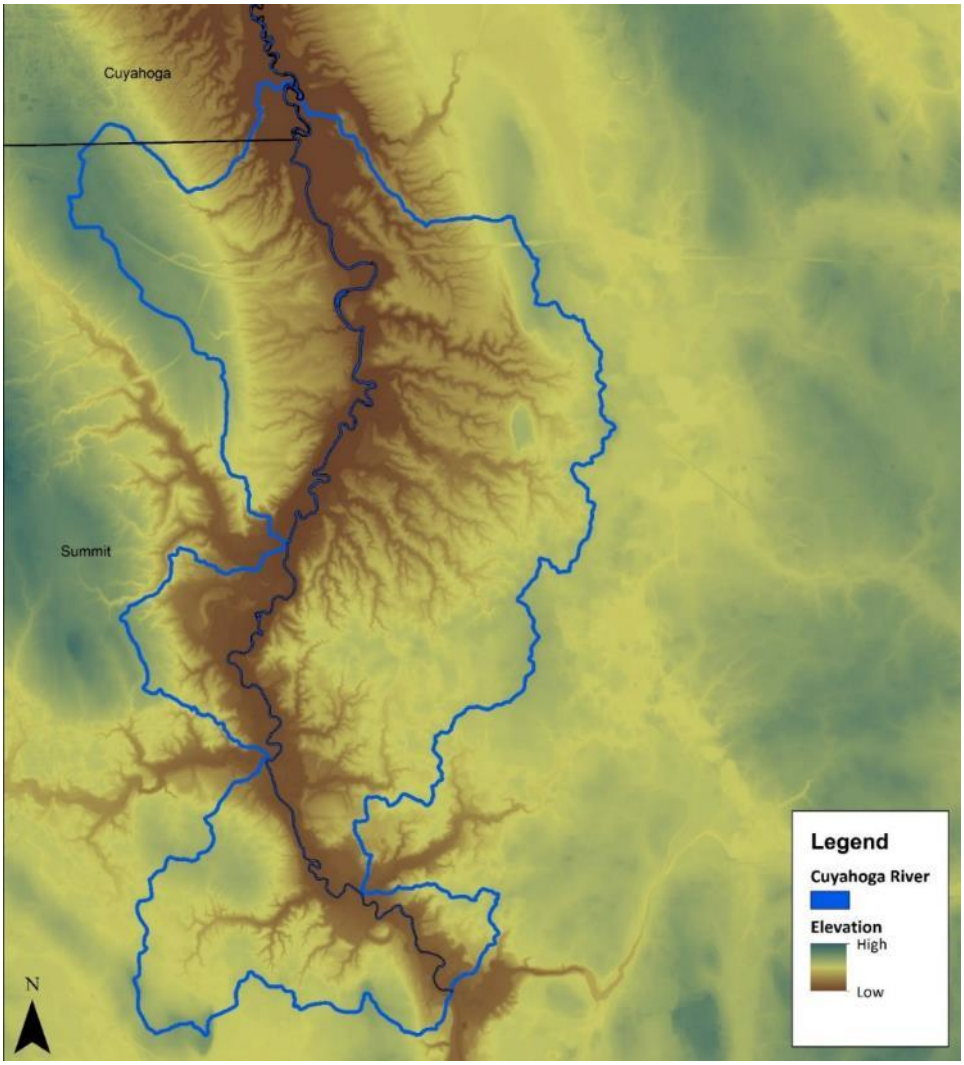

Figure 3: Boston Run-Cuyahoga River Watershed - Elevation Map

Pursuant to the Great Lakes Water Quality Agreement, a joint commitment between the United States and Canada, the Cuyahoga River was identified as one of 43 Areas of Concern (AoC) targeted for their inability to support aquatic life or beneficial uses. The Cuyahoga River AoC, which encompasses the lower 46.5 miles of the river and 21 "subwatersheds", has eight remaining Beneficial Use Impairments (BUIs) which require attention and remediation to delist. An impaired beneficial use refers to a change in the chemical, physical, or biological integrity of the identified areas. The BUIs for Aesthetics and Public Access were removed in late 2017; the remaining eight BUIs applicable to the Cuyahoga River AoC are:

- BUI 1: Restrictions on Fish Consumption
- BUI 3: Degradation of Fish Populations
- BUI 4: Fish Tumors and Other Deformities
- BUI 6: Degradation of Benthos
- BUI 7: Restrictions on Navigational Dredging
- BUI 8: Eutrophication or Undesirable Algae
- BUI 10a: Beach Closings (Recreational Contact)

- BUI 14: Loss of Fish Habitat

While these "subwatersheds" are not delineated by the same criteria as the HUCs, the Boston Run-Cuyahoga River watershed does fall within the AoC's Cuyahoga Valley National Park, Brandywine Creek, Middle Cuyahoga River, and Sand Run areas.

1.3 PUBLIC PARTICIPATION AND INVOLVEMENT

Summit Metro Parks led the participation and outreach effort for this first version of the Boston Run-Cuyahoga River NPS-IS Plan.

1.3.1 2018 Outreach

Summit Metro Parks hosted or participated in several meetings with local government representatives as outlined below:

December 21, 2017 – Metro Parks hosted a meeting with City of Akron environmental staff and staff of the Summit Soil and Water Conservation District. The Sand Run critical area was discussed within the context of the overall NPS-IS planning process.

March 29, 2018 – Summit Metro Parks hosted a meeting with Summit SWCD and City of Akron staff to discuss the development of an NPS-IS plan for the Boston Run watershed with emphasis on Sand Run as a Critical Area.

July 23, 2018 – Summit Metro Parks attended a meeting at the City of Akron with representatives of NEFCO (Northeast Ohio Four County Regional Planning and Development Organization) to discuss NPS-IS development over all of Summit County.

July 30, 2018 – Summit Metro Parks contacted all the stakeholders in the Boston Run-Cuyahoga River watershed regarding the preparation of this NPS-IS plan. The contents of the letter and a mailing list are provided below.

> Dear XXX:
>
> Over the years, Sand Run Metro Park (located within the cities of Akron and Fairlawn) has experienced extreme erosion events related to stormwater flow from our largely developed and urbanized watershed. The erosion in Sand Run Metro Park is severe and in some instances, threatens water quality, biodiversity, and park infrastructure (roads, trails, lodges, etc.).
>
> Metro Parks is preparing a multi-phased approach to help address this situation. In the future, we plan to launch a public education and outreach effort to inform residents how they can help improve stream quality. More immediately, we plan to address the physical erosion and damage we see happening using (when possible) stream restoration and bioengineering techniques. Metro Parks has prepared a concept plan to address erosion and improve habitat quality along the entire stretch of Sand Run within our boundaries. We plan to apply for funding this fall and through 2019 to implement portions of this concept plan.
>
> One funding source we plan to access is Ohio EPA's Section 319 program. A new requirement of the Section 319 program is the preparation of a nine-element non-point source pollution implementation strategy (NPS-IS) document.
>
> These documents are written based on 12-digit HUC boundaries. Sand Run is part of the Boston Run – Cuyahoga River Watershed (HUC# 041100010405). I have included a map of this watershed in relationship to the communities it touches or encompasses.

Metro Parks has begun the preparation of this plan. NPS-IS plans are intended to be working documents that can be added to and edited by all the communities within the watershed. When completed, Metro Parks will make this document available to your community to edit or update as you like.

No action is required on your part. If you would like additional information, please do not hesitate to contact me directly or our Chief of Conservation; Mike Johnson. Mike's direct number is 330-865-8057 x 221.

Sincerely,

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Executive Director

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1.3.2 2019 Outreach

March 6, 2019 – Summit Metro Parks met with representatives of NEFCO (Northeast Ohio Four County Regional Planning and Development Organization) ERTAC (Environmental Resources Technical Advisory Committee) at the Cuyahoga Falls Natatorium to present a draft version of this plan.

2 BOSTON RUN-CUYAHOGA RIVER WATERSHED CHARACTERIZATION AND ASSESSMENT SUMMARY

2.1 BOSTON RUN-CUYAHOGA RIVER WATERSHED CHARACTERIZATION

2.1.1 Physical and Natural Features

Geological

One hundred and seven different soil types of 43 series groups underlie the Boston Run-Cuyahoga River watershed [7]. Of those, the 10 ten most prevalent soil groups are listed in Table 1: Boston Run-Cuyahoga River Watershed. By acreage, Urban soils (anthropogenically manipulated soils, inclusive of classified Urban soils, Udorthents and Gravel pits, etc which may contain fill materials from dredging operations, construction debris, and coal ash, among others [8]) account for less than 3% of the total. However, when urban soil complexes (Chili-Urban land complex, undulating, etc) and traditional urban soils are summed, they account for approximately 10.5% (3,117.67 ac.) of the total underlying soil series.

Table 1: Boston Run-Cuyahoga River Watershed – Prevalent Soil Series

Soil Group	Acres	%
Ellsworth Series	7563.1	25.47%
Cardinal-Mentor Series	3610.4	12.16%
Glenford Series	3054.89	10.29%
Rittman Series	1940.02	6.53%
Chagrin Series	1877.22	6.32%
Mahoning Series	1539.56	5.19%
Chili Series	1496.94	5.04%
Oshtemo Series	1439.74	4.85%
Geeburg Series	1165.3	3.92%
Urban Series	761.48	2.56%
Other	5243.33	17.66%

The Ellsworth Series (2 to 50 percent slopes) consists of very deep, moderately well drained soils formed in till on till plains. The Cardinal-Mentor (25 to 75 percent slopes) and Glenford (0 to 18 percent slopes) soil series consist of very deep, moderately to well drained soils formed in in stratified Wisconsinan age stream sediments on terraces in valleys on lake plains and outwash plains. These soils are typically found on terraces, lake plains, and outwash plains [9]. The predominant soils in the watershed are highly erodible and can contribute significantly to sedimentation and nutrient loading [10].

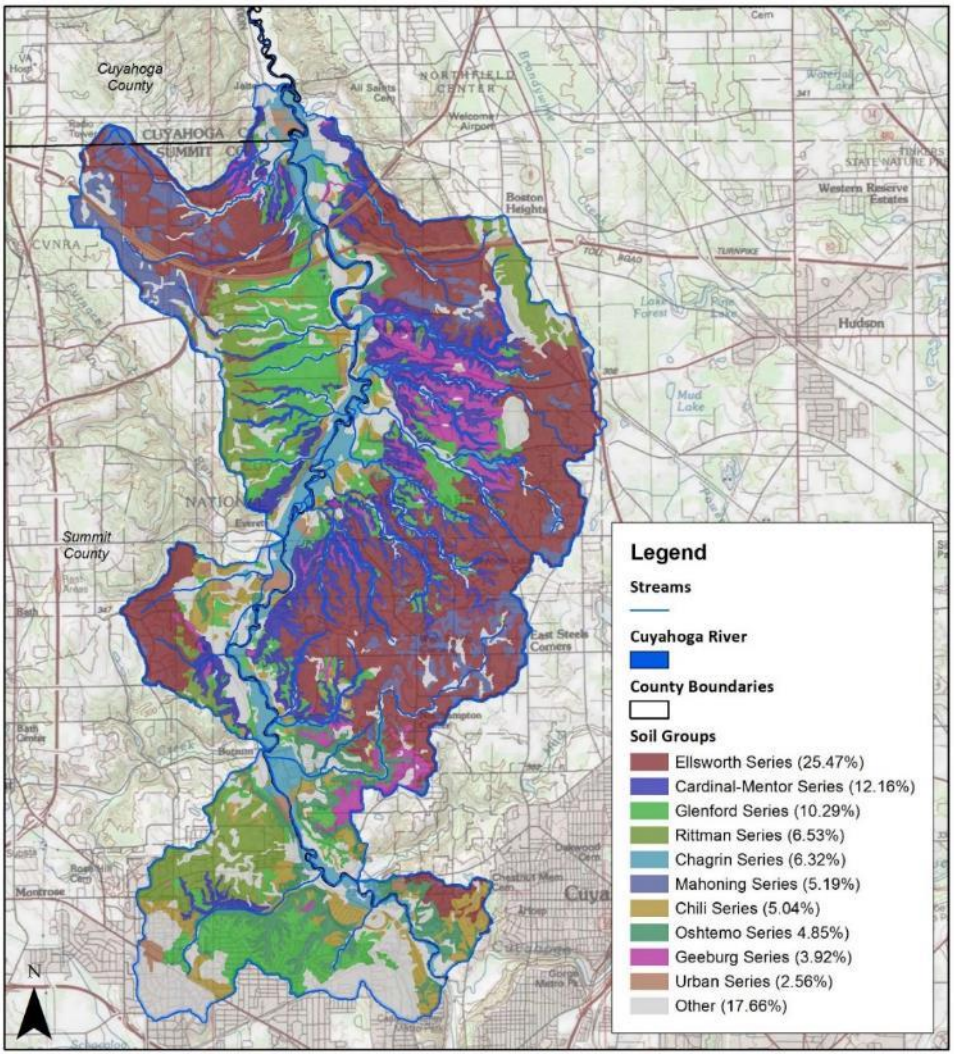

Figure 4: Boston Run-Cuyahoga River Watershed - Soil Series Map

Image 3: Erosional Slump adjacent to Sand Run and Sand Run Parkway in Sand Run Metro Park

Biological

Overall, the Boston Run-Cuyahoga River watershed is in excellent condition due to its protected conservation status throughout much of its extent.

National Wetlands Inventory

The U.S. Fish and Wildlife Service (USFWS) is the principal federal agency tasked with providing information to the public on the status and trends of wetlands within the United States. These data are distributed via the National Wetlands Inventory (NWI), a crucial component in the understanding of wetland distribution and location at the landscape-level. NWI features typically have a coarse degree of accuracy associated, much less than a jurisdictional wetland delineation (see Section 3.2.1 Sand Run Characterization). The Boston Run-Cuyahoga watershed contains 404 mapped NWI wetlands accounting for approximately 1021 acres (3.4% of total acres). The majority of these mapped wetlands are classified as Forested/Shrub-Scrub wetlands, with the Riverine classification second. These Riverine wetlands are understood to be the Cuyahoga River surface acreage.

Image 4: PEM/PSS wetland complex at Wetmore Rd

Like most other impacted watersheds, the range of wetland quality depends on the location within the watershed. For a high gradient watershed such as this, one might expect a spectrum of wetland qualities with strongly bimodal tendencies; wetlands with primary impacts and those with cumulative impacts. Wetlands occurring near the periphery of the watershed (primarily those on the higher elevations closer to population centers and highways) can be expected to have lower Ohio EPA Ohio Rapid Assessment Method (ORAM) scores due to the higher degree of modification. Additionally, those occurring along the Cuyahoga River fringe could expect to have slightly lower ORAM scores due to the cumulative downstream impacts of individual watershed tributaries. In the case of the Boston Run-Cuyahoga River watershed these wetlands typically retain wide buffers, a diversity of habitat features, and sufficient hydrology. The remaining wetlands within the watershed not burdened by ecosystem services attributable to modification or urban stressors, nor downstream cumulative effects might be expected to have, on average, higher ORAM scores correlating to a lesser degree of disturbance. Clearly, a significant amount of moderate to high quality wetlands exists in the watershed; according to acreage and number. The Boston Run-Cuyahoga River watershed has a relatively rich wetlands inventory, and consequently, a need to protect these important water resources both for their intrinsic value and ecosystem services.

Table 2: Boston Run-Cuyahoga River Watershed – National Wetlands Inventory

Wetland Type	Acres	%
Freshwater Emergent Wetland	136.34	13.36%
Freshwater Forested/Shrub Wetland	340.54	33.37%

Wetland Type	Acres	%
Freshwater Pond	258.21	25.30%
Lake	21.90	2.15%
Riverine	263.63	25.83%
Total	*1020.62*	*100.00%*

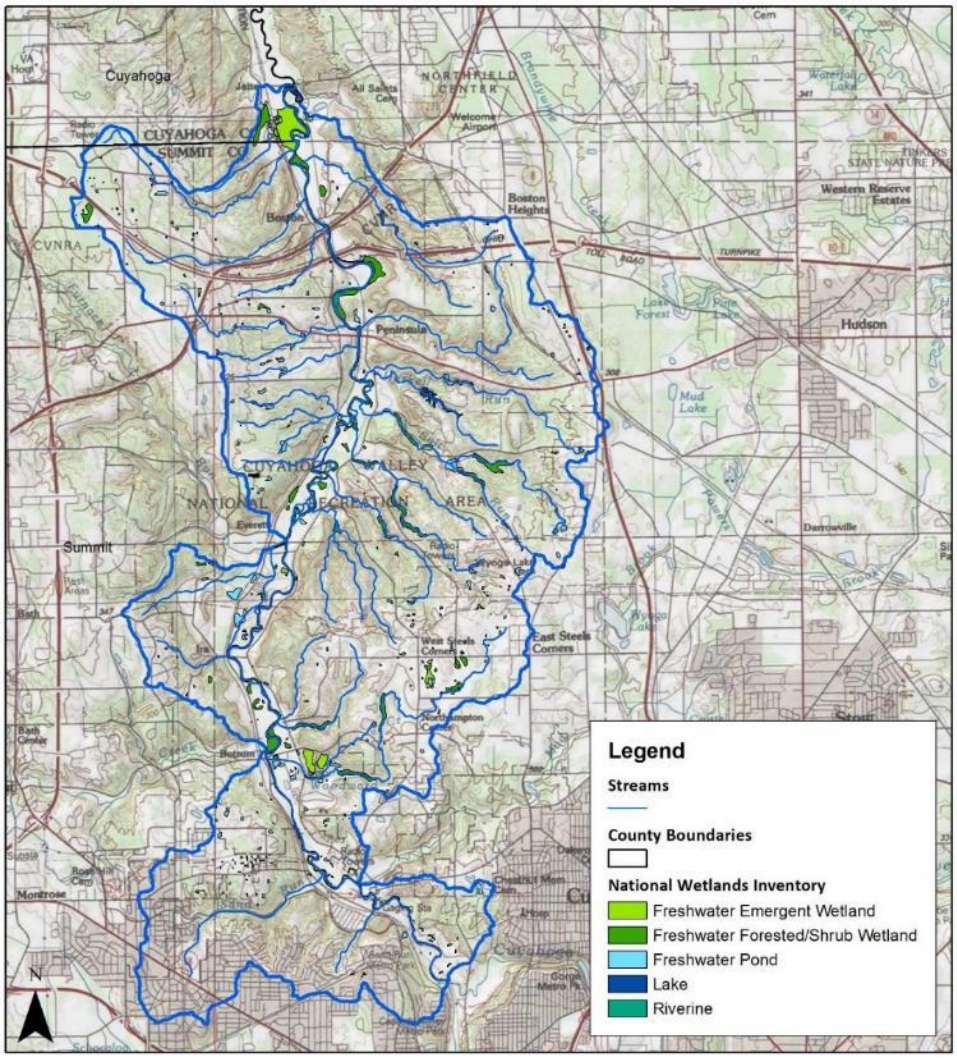

Figure 5: Boston Run-Cuyahoga River Watershed - NWI Map

Federal and State Listed Species:

Federally Listed Species

The USFWS maintains a searchable database for both official and unofficial coordination regarding distribution and occurrence of federally-listed species. Species information reflects either probable or known occurrence, however, differentiation is difficult to determine. The Information for Planning and Consultation (IPAC) database provided information for the following listed species within the Boston Run-Cuyahoga River watershed:

Table 3: Boston Run-Cuyahoga River Watershed – Federally Listed Species with the Potential to Occur

Scientific Name	Common Name	Category	USFWS Status
Myotis sodalis	Indiana bat	Mammal	Endangered
Myotis septentrionalis	Northern long-eared bat	Mammal	Threatened
Setophaga kirtlandii	Kirtland's warbler	Bird	Endangered
Charadrius melodus	Piping plover	Bird	Endangered
Calidris canutus rufa	Rufa red knot	Bird	Threatened
Aconitum noveboracense	Northern wild monkshood	Vascular plant	Threatened

Additionally, although the bald eagle (*Haliaeetus leucocephalus*) has been de-listed as an endangered species, it is still protected under the Migratory Bird Treaty Act, the Bald and Golden Eagle Act, as well as the Lacey Act. USFWS includes the bald eagle for all counties in Ohio as a Species of Concern.

State Listed Species

While the USFWS provides oversight and coordination on federally-listed species, typically it falls to the state(s) to manage and disseminate information regarding state and federally-listed species occurrence and distribution. Coordination with Ohio Division of Wildlife, Department of Natural Resources (ODNR) Natural Heritage Database (NHD) provided the following information regarding listed species, geological features, high quality plant habitats, or animal assemblages. within the Boston Run-Cuyahoga River watershed. A total of 57 records were retrieved within the watershed. The NHD provides occurrence information, but it is their policy not to divulge large-scale datasets to protect sensitive species.

There are nine records for state Endangered and Threatened species each within the Boston Run-Cuyahoga River watershed and 24 state Protected species records, a third-tier designation reserved for plant species; the equivalent for animals is Species of Concern, of which there are three. The Boston Run-Cuyahoga River watershed is relatively rich in listed species and habitat occurrence. For a table of state-listed species identified within the Boston Run – Cuyahoga River watershed, please see Appendix A.

Image 5: Heronry at Bath Rd

Non-Native, Invasive Species:

Comprehensive inventories of non-native, invasive species have not been completed for the entirety of the Boston Run-Cuyahoga River HUC 12 watershed, although detailed information exists for some areas. Terrestrial invasive plant species have been enumerated from the lists of deleterious species as outlined by various state agencies and conservation organizations as well as professional knowledge [11] [12] [13] [14]. Invasive species vary in their ability to colonize and alter ecosystems; from passive entry to full-scale alternation of ecosystem services and species composition. Table 4: Boston Run-Cuyahoga River Watershed – Invasive Plant Species lists the most common non-native, invasive plant species identified within the Boston Run-Cuyahoga River watershed.

Table 4: Boston Run-Cuyahoga River Watershed – Invasive Plant Species

Scientific Name	Common Name	Family	Taxa Group	Habitat	Growth Habit
Predominantly Wetland Species					
Frangula alnus	glossy buckthorn	Rhamnaceae	Dicot	Mesic to Wet	Shrub
Lythrum salicaria	purple loosestrife	Lythraceae	Dicot	Mesic to Wet	Herbaceous
Myriophyllum spicatum	Eurasian water milfoil	Haloragaceae	Dicot	Mesic to Wet	Aquatic
Najas major	slender naiad	Haloragaceae	Dicot	Mesic to Wet	Aquatic
Phalaris arundinacea	reed canary grass	Poaceae	Monocot	Mesic to Wet	Herbaceous
Phragmites australis	giant reed	Poaceae	Monocot	Mesic to Wet	Herbaceous
Polygonum cuspidatum	Japanese knotweed	Polygonaceae	Dicot	Mesic to Wet	Herbaceous
Potamogeton crispus	curly pondweed	Potamogetonaceae	Monocot	Mesic to Wet	Herbaceous

Scientific Name	Common Name	Family	Taxa Group	Habitat	Growth Habit
Ranunculus ficaria	fig buttercup	Ranunculaceae	Dicot	Mesic to Wet	Herbaceous
Typha angustifolia	narrow-leaf cattail	Typhaceae	Monocot	Mesic to Wet	Herbaceous
Typha x glauca	hybrid cattail	Typhaceae	Monocot	Mesic to Wet	Herbaceous
Predominantly Upland Species					
Bromus inermis	smooth brome	Poaceae	Monocot	Dry to Mesic	Herbaceous
Cirsium arvense	Canada thistle	Asteraceae	Dicot	Dry to Mesic	Herbaceous
Conyza canadensis	horsetail	Asteraceae	Dicot	Dry to Mesic	Herbaceous
Dipsacus fullonum	common teasel	Dipsacaceae	Dicot	Dry to Mesic	Herbaceous
Dipsacus laciniatus	cutleaf teasel	Dipsacaceae	Dicot	Dry to Mesic	Herbaceous
Elaeagnus umbellata	autumn olive	Elaeagnaceae	Dicot	Dry to Mesic	Shrub
Lonicera japonica	honeysuckle, Japanese	Caprifoliaceae	Dicot	Dry to Mesic	Vine
Lonicera maackii	honeysuckle, bush	Caprifoliaceae	Dicot	Dry to Mesic	Shrub
Lonicera morrowii	honeysuckle, bush	Caprifoliaceae	Dicot	Dry to Mesic	Shrub
Lonicera tartarica	honeysuckle, bush	Caprifoliaceae	Dicot	Dry to Mesic	Shrub
Rosa multiflora	multiflora rose	Rosaceae	Dicot	Dry to Mesic	Shrub

The Ohio EPA has identified the most common invasive fish species in collections as common carp (*Cyprinus carpio*) and gizzard shad (*Dorosoma cepedianum*). There have also been reports of Eurasian goby species found in the watershed by Northeast Ohio Regional Sewer District (NEORSD) sampling efforts. Other potentially harmful invasive aquatic animal species include zebra mussels, not yet noted in the watershed, and the rusty crayfish (*Faxonius rusticus*), most likely in the watershed. Potential impacts of the rusty crayfish include continued decline of native species (both from competition of food and niche spaces, and subsequent increased predation due to lack of cover), loss of aquatic plant abundance and diversity, and decline of sunfish species due to competition for food and nest predation by *F. rusticus* [15].

Additionally, numerous plant species have invaded the aquatic/semi aquatic habitat which typically have negative impacts on the watershed and its associated wetlands. In general, invasive plant species out-compete native plants, resulting in decreased plant diversity and other impacts which ascend the trophic levels. Plant species which fit this classification include reed canary grass (*Phalaris arundinacea*), narrow-leaved cattail (*Typha angustifolia*), buckthorn (*Frangula alnus*), common reed (Phragmites australis), garlic mustard (*Alliaria petiolata*), Japanese honeysuckle (*Lonicera japonica*), Japanese knotweed (*Polygonum cuspidatum*), purple loosestrife (*Lythrum salicaria*), multiflora rose (*Rosa multiflora*) and Eurasian water milfoil (*Myriophyllum spicatum*). However, some invasive species can be a benefit to anthropogenically-altered landscapes by sequestering salts and heavy metals and providing cover and food in niche environments where native species can no longer thrive [16].

2.1.2 Land Use and Protection

The Boston Run-Cuyahoga River watershed contains 15 mapped land cover types, according to the National Land Cover Database [17]. Overwhelmingly, the forested cover types (Deciduous, Evergreen, Woody Wetlands) account for the majority (63.89%) of the land cover. Developed land (Open Space, Low, Medium, and High Intensity) accounts for a cumulative 26.29%. This majority of natural land cover type offers a greater degree of protection to the surface water features within; greater riparian and wetland buffers, ecosystem services, and ecosystem resiliency.

Table 5: Boston Run-Cuyahoga River Watershed – Land Cover Types

Land Cover Type	Acres	%
Open Water	374.35	1.26%
Developed, Open Space	4266.14	14.37%
Developed, Low Intensity	2636.9	8.88%
Developed, Medium Intensity	731.58	2.46%
Developed, High Intensity	173.66	0.58%
Barren Land	12.75	0.04%
Deciduous Forest	17266.85	58.15%
Evergreen Forest	512.34	1.73%
Mixed Forest	10.09	0.03%
Shrub / Scrub	69.96	0.24%
Grassland / Herbaceous	714.75	2.41%
Pasture / Hay	1217.57	4.10%
Cultivated Crops	517.76	1.74%
Woody Wetlands	1165.93	3.93%
Emergent Herbaceous Wetlands	24.81	0.08%

The Countryside Initiative Program was created to preserve "the fading rural character of the Cuyahoga Valley" [18]. To facilitate this goal, the Countryside Conservancy was created in 1999 to assist the Cuyahoga Valley National Park. Of the 11 farms under this program, seven (Brunty Farms, Neitenbach Farm, Sarah's Vineyeard, Goatfeathers Point Farm, Greenfield Berry Farm, The Trapp Family Farm, and Purplebrown Farmstead) are located entirely or partially within the Boston Run-Cuyahoga River watershed. The acreage tended to by these seven farms may account, in part, for the lands mapped as Pasture/Hay or Cultivated Crops. Areas of agricultural conversion can be typically expected to have overall negative impacts on the ecosystem; whether through actively maintained species monoculture, or, in the case of livestock, runoff from waste leading to increased nutrification. However, these negative effects are limited by best management practices imposed through the charter of the Countryside Conservancy.

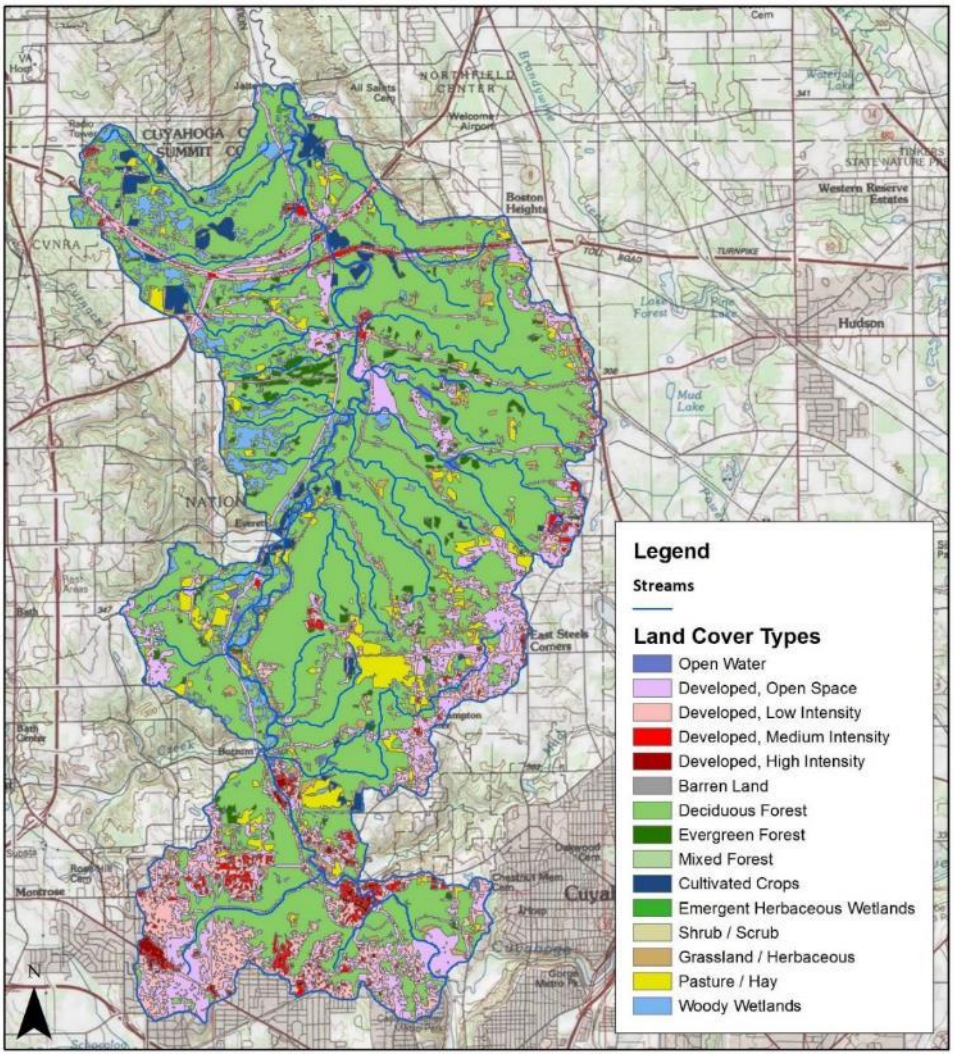

Figure 6: Boston Run-Cuyahoga River Watershed - Land Cover Map

Approximately 47% (13,937.61 ac.) of the land area within the Boston Run-Cuyahoga River watershed is protected by some legal measure. The Cuyahoga Valley National Park manages the largest portion of this protected land, at over 11,300 acres. Summit Metro Parks manages the bulk of the balance, with Sand Run Metro Park encompassing 1,174.31 acres within the Boston Run-Cuyahoga River Watershed.

Table 6: Boston Run-Cuyahoga River Watershed – Protected Lands

Area Name	Management	Acres[1]
Brecksville Reservation	Cleveland Metroparks	154.04
Stumpy Basin	Kent State University	77.01
Cuyahoga Valley National Park	National Park Service	11324.57
Columbia Run	National Park Service	243.02

[1] Acreages calculated using the ArcMap calculate tool from polygons provided by ODNR's NHD review request.

Area Name	Management	Acres[1]
O'Neil Woods Metro Park	Summit Metro Parks	25.48
Hardy Road (Hampton Hills Metro Park)	Summit Metro Parks	315.53
Sand Run Metro Park	Summit Metro Parks	1174.31
Cascade Valley Metro Park	Summit Metro Parks	10.04
Hampton Hills Metro Park	Summit Metro Parks	383.56
Waldo Semon Woods Conservation Area	Summit Metro Parks	79.63
Riding Run Conservation Area	Summit Metro Parks	85.91
Deep Lock Quarry Metro Park	Summit Metro Parks	64.51

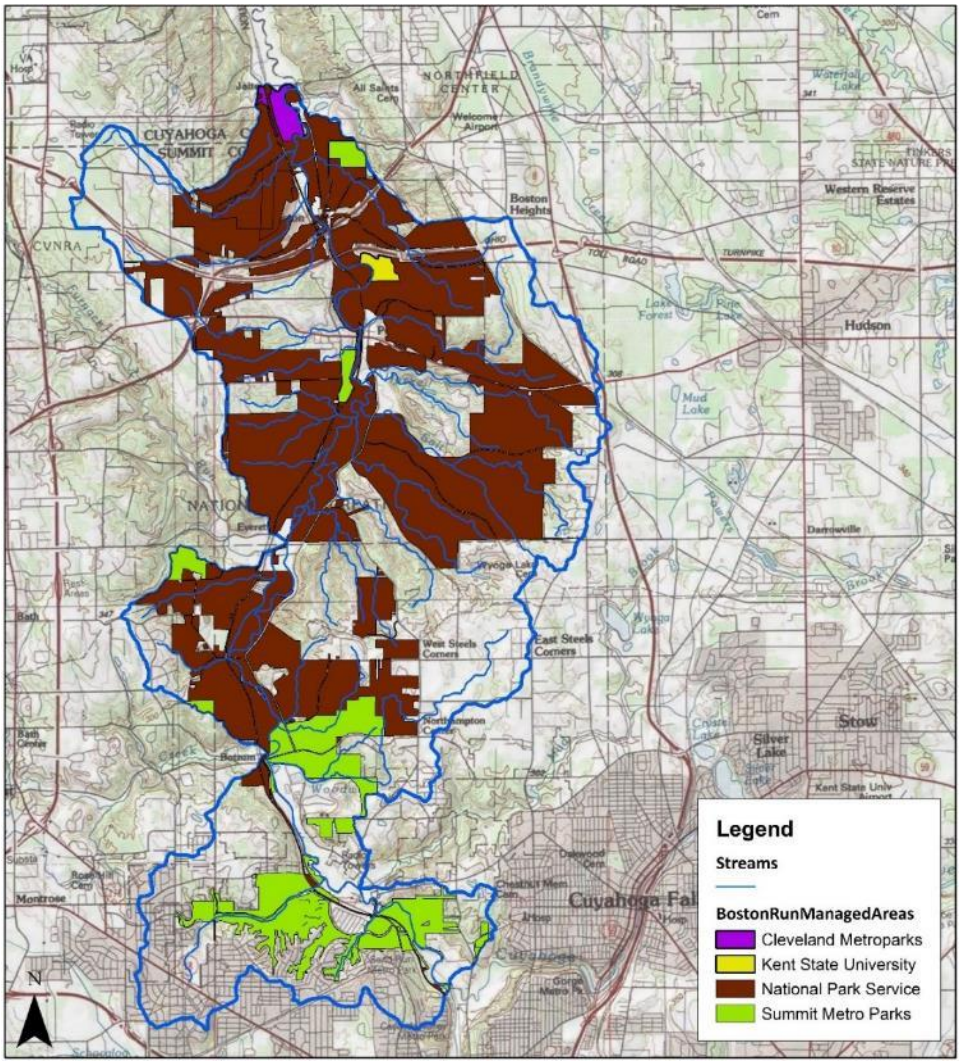

Figure 7: Boston Run-Cuyahoga River Watershed - Protected Lands Map

2.2 BOSTON RUN-CUYAHOGA RIVER BIOLOGICAL TRENDS

The Lower Cuyahoga River Total Maximum Daily Load (TMDL) report was approved by U.S. EPA on September 26, 2003. For the Boston Run-Cuyahoga River Watershed Assessment Unit, the statuses of the recreational and human health uses are summarized as follows [10]:

Aquatic Life: Impaired
Recreation: Impaired (bacteria; *E. coli*)
Drinking Water: No waters currently utilized for water supply
Fish Tissue: Impaired (PCBs in fish tissue)

Only four monitoring aquatic life use monitoring stations exist within the 46.44 sq. mi. Boston Run-Cuyahoga River watershed, as opposed to the 12 stations within the Fish Creek-Cuyahoga River watershed or the 10 stations within the significantly smaller 16.62 sq. mi. Pond Brook watershed. Therefore, detailed biological trends are difficult to summarize across such a large and hydrologically diverse watershed.

Table 7: Boston Run-Cuyahoga River Watershed – OEPA Aquatic Life Use Monitoring Stations

Sampling Station	Sampling Year	RM	Latitude	Longitude	ALU	IBI Score	ICI Score	QHEI Score
CUYAHOGA R. @ BOSTON MILLS RD.	2008	26.5	41.2628	-81.5603	Partial WMH	36 Marginally Good	38 Good	81.5
CUYAHOGA R. DST. AKRON WWTP @ BOLANZ RD.	2008	33.2	41.2019	-81.5686	Full WMH	42 Good	38 Good	83
CUYAHOGA R. AT AKRON, 0.5 MI. DST. OLD PORTAGE TRAIL	2008	39.7	41.1386	-81.5528	Full WMH	36 Marginally Good	42 Very Good	81
SAND RUN @ RIVERVIEW RD N OF AKRON	1996	0.2	41.13864	-81.5618	Non WMH	26 Marginally Good	N/A Unsampled	59

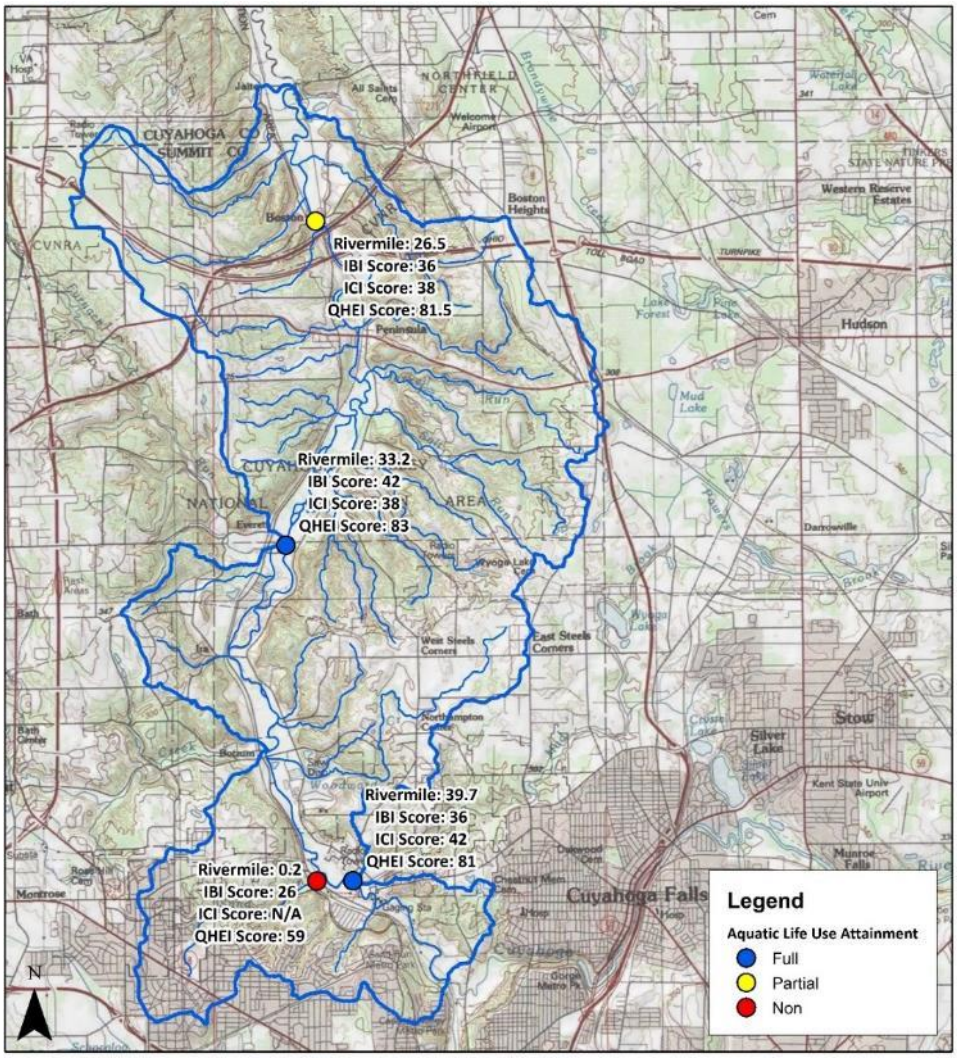

Figure 8: Boston Run-Cuyahoga River Watershed - OEPA Aquatic Life Use Monitoring Stations

2.3 BOSTON RUN-CUYAHOGA RIVER POLLUTION CAUSES AND ASSOCIATED SOURCES

Ohio EPA's 2016 and new 2018 Integrated Water Quality Monitoring and Assessment Report [2] [19] list the causes and sources of impairment within the Boston Run-Cuyahoga River watershed as follows.

Causes of Impairment	*Sources of Impairment*
fish passage barrier	dam or Impoundment
direct habitat alterations	loss of riparian habitat
nutrients	golf courses

The narrative of the physical and biological conditions from the Lower Cuyahoga River TMDL:

> *"Biological impairment in the Cuyahoga River downstream from Akron was manifest most strongly in the fish. Fish communities were poor or very poor at nearly all sites between*

Akron and Cleveland, beginning downstream from the Little Cuyahoga River. Both organism groups were in the fair to very poor ranges downstream from the Akron WWTP for a minimum of four river miles. Macroinvertebrates tended to reflect enrichment effects while fish exhibited more chronic or toxic influences downstream from Akron. US EPA and Ohio EPA recent investigations indicate possible adverse effects from endocrine disrupting compounds that were found in fish tissue. In contrast to the fish communities, macroinvertebrates gradually improved and reached very good to exceptional quality upstream from Cleveland.

***"Haskell Run (Confluence RM 29.82)** Haskell Run is a small tributary to the Cuyahoga River that is mostly contained within the Cuyahoga Valley National Park. A Boy Scout Camp, a large lake, and several small package plants are located in upper basin. The Brandywine Golf Course is located in the lower reaches along Cuyahoga flood plain. The stream is in full attainment immediately downstream from the from the small package WWTPs. Partial attainment was found in the stream near the mouth as it coursed through a golf course. Removal of the riparian vegetation and nutrients believed to be a result of golf course run-off resulted in fair quality macroinvertebrate communities. Except for sulfate, there were no obvious elevated chemical parameters in 2000. However, heavy algal growth below the golf course was also observed in 2001 during very low summer flows and points to elevated nutrient levels.*

***"Sand Run (Confluence RM 39.12)** Habitat in Sand Run was impaired by urban runoff and storm water from Akron and Fairlawn. The channel was sinuous and developed, contained a variety of substrates of differing sizes, and was bordered by a wide riparian corridor. However, flashy stream flows due to storm water severely eroded the banks and substrates were extensively embedded. Consequently, the habitat was marginally suited to warmwater habitat faunas. In addition to urban development in the headwaters, about five to seven small low-head dams are also located along the length of the stream. The dams could pose a barrier to fish migration and recolonization and should be evaluated for removal. Fish communities in Sand Run were severely impacted by urban storm water runoff from the city of Fairlawn. Effects of flashy flows were evident in severe bank erosion, embedded substrates, and a destabilized channel. As such, only six species were collected, of which three were tolerant and composed 97% of the community. Macroinvertebrate collections near the mouth found only fifteen total taxa and three EPT taxa in very low densities."*

With more than 1,200 people/sq. mi, the Cuyahoga River watershed as a whole is one of the most densely populated in the state, although, as noted previously, the Boston Run-Cuyahoga River watershed is primarily forested with developed space accounting for only 26.3% and urbanized space accounting for around 12%. The Ohio EPA's 2016 Nutrient Mass Balance Study for Ohio's Major Rivers [20] provides calculations for annual phosphorus and nitrogen loads originating from select Ohio watersheds, broken out by source. In the Cuyahoga River watershed, approximately 60% of the phosphorus load and 32% of the nitrogen load originate from non-point sources, despite the urbanized nature of the overall Cuyahoga River watershed.

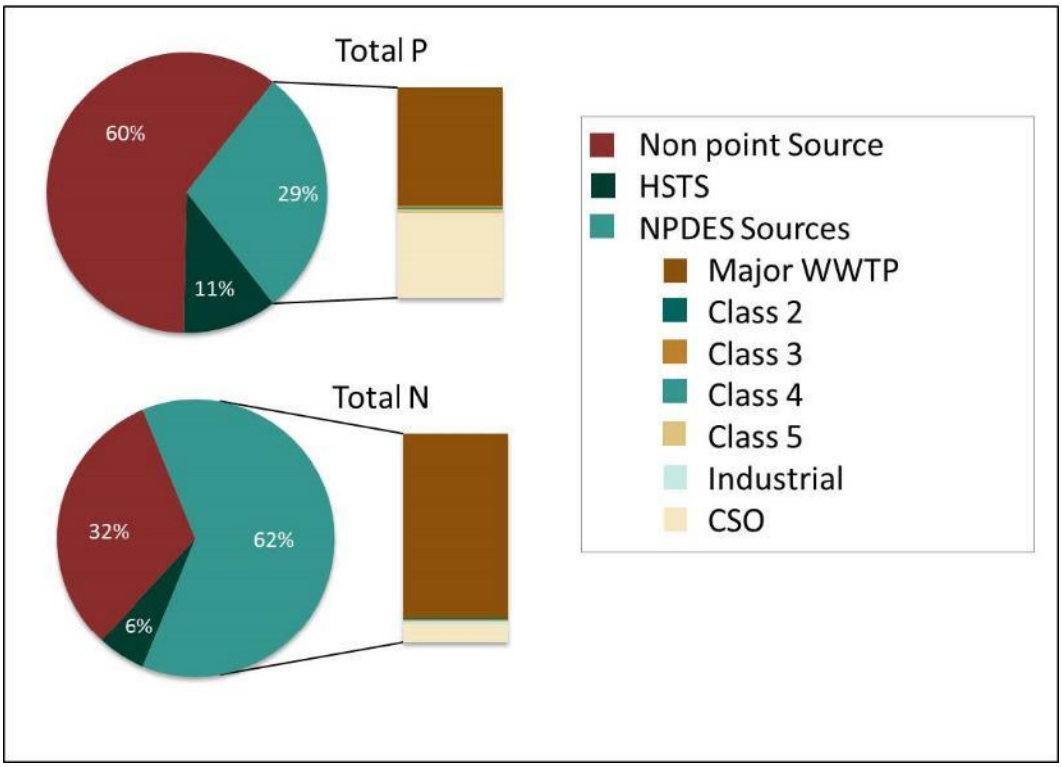

Figure 9: Cuyahoga River Annual Phosphorus-Nitrogen Mass Balance Calculations [20]

2.3.1 Dams and Impoundments

Thirty-seven dams are recognized and monitored by the Ohio DNR within the Boston Run-Cuyahoga River watershed, 18 of which are privately owned. Of the remaining 19, four are unclassified and 15 are publicly owned-either on the local or federal level. For a complete list of dams within the Boston Run-Cuyahoga River watershed, please see Appendix B.

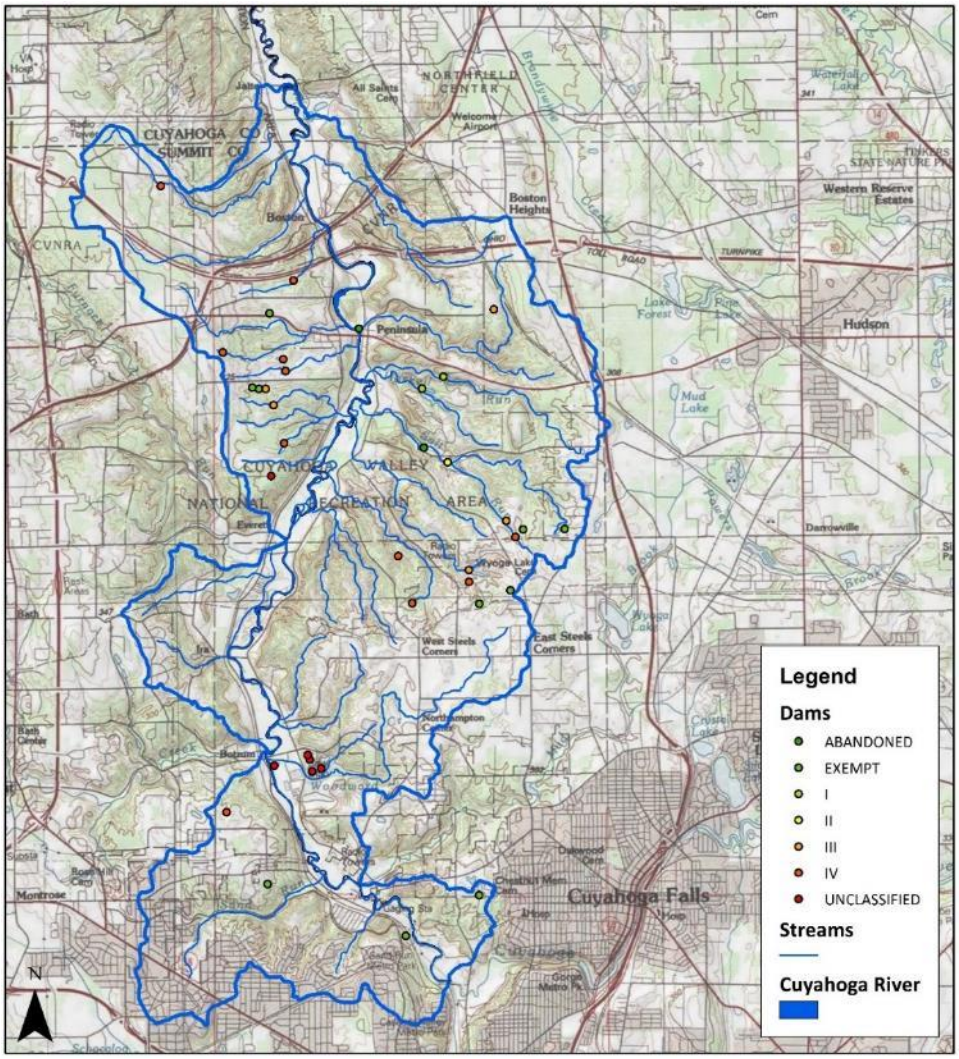

Figure 10: Boston Run-Cuyahoga River Watershed - Dams

2.3.2 Loss of Riparian Habitat

As mentioned in Section 2.1.2 Land Use and Protection, the proportion of residential development and urbanization is highest within Critical Area 1. This land use change has encroached on waterways and wetlands to maximize human real estate, and in doing so, has left much of the land in Critical Area 1 bereft of hydraulic capacity. Therefore, rain events tend to lead to flashy flows downstream, siltation, embeddedness, and nutrient runoff. 2.1.2

2.3.3 Golf Courses

In addition to directly altering habitat by means of island creation, deforestation, habitat fragmentation, and the reduction of native species in favor of non-native and sometimes invasive horticultural species, golf courses are a direct source of nutrification. Although new golf course construction is held to a more ecologically-stringent standard than previously, established and older courses did not have this same benefit. Typically, they were constructed and maintained with very little in the way of riparian buffer or wetland functionality, which allows fertilizer and pesticide runoff to enter waterways more quickly and

without the benefit of natural attenuation. To compound this calamity, golf courses typically use an estimated 408 billion gallons of water per day cumulatively [21] to maintain healthy vegetation; maintained short turf grasses and hard-packed soils allow for little infiltration.

The ecological value of a golf course is dependent upon its location and the surrounding land use. When the surrounding landscape is significantly more fragmented or degraded than the golf course island, golf courses can and do provide ecological benefit. However, a golf course established in an area dominated by protected and natural spaces, such as the Cuyahoga Valley National Park and Summit Metro Parks, functions to reduce the ecological benefits of the area as a whole [22] [23].

There are five golf courses within the Boston Run-Cuyahoga River watershed. Fairlawn Country Club, which surrounds the headwaters of Sand Run; Brandywine Golf Course and Brandywine Par 3 Golf Course, which straddle the heavily-modified Ritchie and Haskell Runs and border the Cuyahoga River directly; Riverwoods Golf Course (abandoned), which hugs more than a mile (approximately 6,500 linear feet) of the right descending bank of the Cuyahoga River; and the majority of the decommissioned Valley View Golf Club, which was acquired by Summit Metro Parks in 2017 and incorporated into Sand Run Metro Park (see section 3.2.1.2 Land Use and Protection for further information).

Image 6: Eroded Bank of Cuyahoga River in the Former Valley View Golf Course
Erosion due to lack of riparian buffers. Photo courtesy of Summit Metro Parks

2.4 Additional Information for Determining Critical Areas and Developing Implementation Strategies

At the time of this writing (version 1.0), only Critical Area 1: Sand Run Catchment and Adjacent has been identified. Should subsequent investigation identify additional Critical Areas, this document will require an update to reflect those additions should 319 funding be sought.

Ohio EPA's *Support for the Development of Management Actions in Cuyahoga Area of Concern*, January 2017 [24] by Tetra Tech was also utilized to determine the critical areas. Boston Run – Cuyahoga River watershed meets the beneficial use impairments for Degradation of Benthos (BUI #6) and loss of fish habitat (BUI #14a), but does not meet the beneficial use impairment for degradation of fish populations (#3a). The proposed management actions to remedy these impairments include removal of the barrier or impoundment, restore habitat (in-stream) and/or reconnect water resource and associated floodplain.

The Cuyahoga Valley National Park Streambank Assessment [25] details erosion along the banks of the Cuyahoga River which threatens land and infrastructure within the park's boundaries and assesses potential measures to strengthen banks and restore floodplain capacity. While land managed by the National Park Service (U.S. Department of the Interior), as a federal agency, is ineligible to receive federal §319 funding, this document highlights the downstream effects of upstream anthropogenic modification, channelization, and urbanization. However, much river access exists within the Boston Run-Cuyahoga River watershed outside the boundaries of the CVNP, and the Cuyahoga River is in much the same condition in those locations. For instance, the receding banks and lateral erosion visible adjacent to the former Valley View golf course in Cuyahoga Falls, within which very little riparian buffer or protection has traditionally been maintained.

Critical Area 1, with more residential development and impervious surface than anywhere else within the watershed, places the greatest amount of anthropogenic pressure on downstream aquatic resources; and thus, these resources bear the greatest load within the Boston Run – Cuyahoga River watershed. Reducing concerns within Critical Area 1 would have the greatest positive impact on the Cuyahoga River of projects within the Boston Run – Cuyahoga River watershed.

3 CRITICAL AREAS CONDITIONS AND RESTORATION STRATEGIES

3.1 OVERVIEW OF CRITICAL AREAS

As discussed, at the time of this writing, only Critical Area 1: Sand Run, City of Fairlawn, and the City of Akron has been identified. Should subsequent investigation identify additional Critical Areas, this document will be updated to reflect those additions. As noted in Section 2.1.2 Land Use and Protection, nearly half (47%) of the Boston Run-Cuyahoga River watershed is encumbered by some form of legal protection. The National Park Service (U.S. Department of the Interior) manages the bulk of this protected land as the Cuyahoga Valley National Park, and therefore much of the land within the Boston Run-Cuyahoga River watershed is ineligible to receive federal §319 funding.

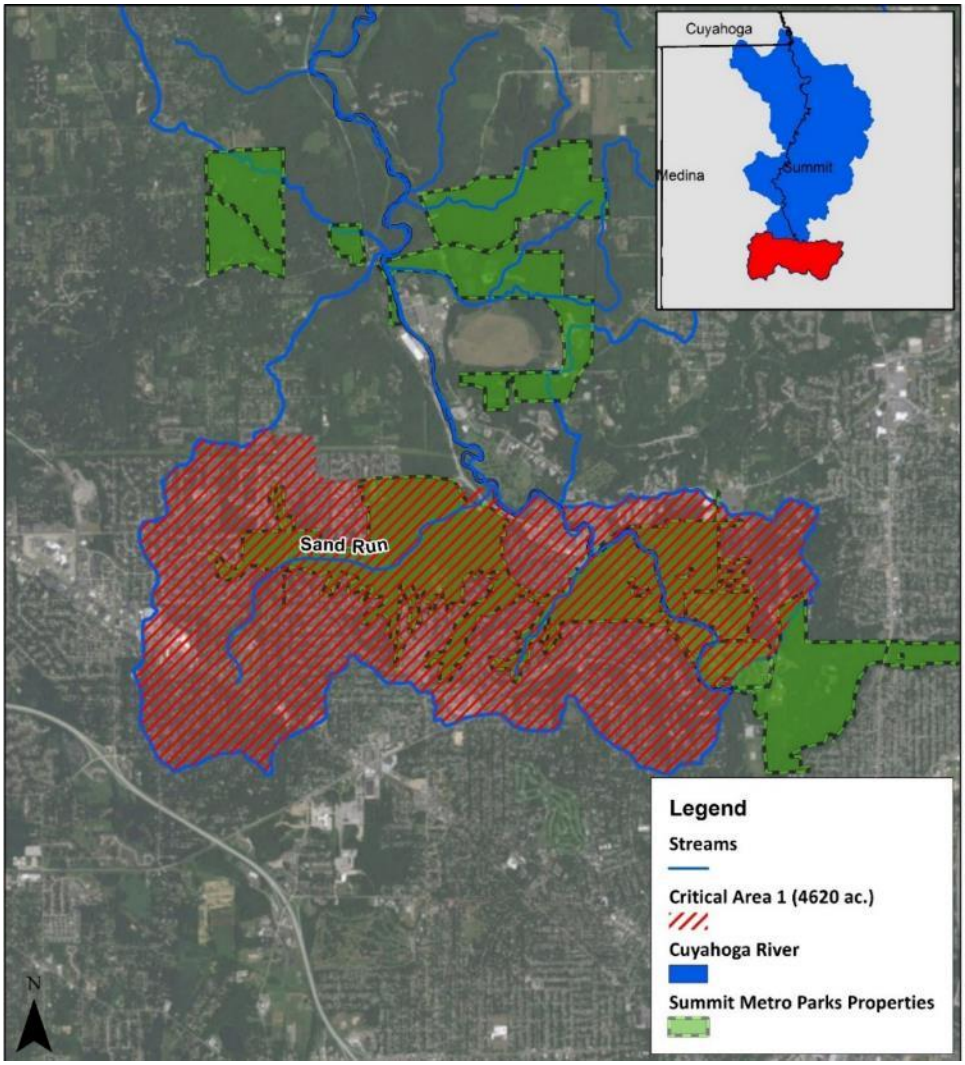

Figure 11: Critical Area 1 - Sand Run Catchment and Adjacent

3.2 CRITICAL AREA 1: SAND RUN WITHIN THE CITY OF FAIRLAWN, AND THE CITY OF AKRON

3.2.1 Critical Area 1 Characterization

As discussed previously, Critical Area 1, with more residential development and impervious surface than anywhere else within the watershed, places the greatest amount of human-induced pressure on downstream aquatic resources. Reducing concerns within Critical Area 1 would have the greatest positive impact on the Cuyahoga River of projects within the Boston Run – Cuyahoga River watershed. The streams found within Critical Area 1 are typically high-gradient headwater streams heavily influenced by urbanized conditions.

The combination of the area's natural geology and stream flow conditions has resulted in ongoing, visible erosion, which will continue to threaten infrastructure and surface water quality (through increased sedimentation), as well as degrade aquatic habitat conditions. Channelization leads to increased embeddedness through particle distribution and sedimentation. Even Sand Run, which maintains a generous riparian corridor within the boundaries of Sand Run Metro Park, lacks the ability to form a naturally meandering channel mainly in order to protect adjacent public infrastructure and utilities which would be endangered by lateral stream movement and associated significant erosion.

3.2.1.1 Physical and Natural Features

Geological

Seventy different soil types of 11 distinct groups underlie Critical Area 1 [7]. The most prevalent soil series type is Glenford. Glenford soils formed in stratified Wisconsinan age glaciolacustrine or stream sediments derived from materials high in sandstone and shale. Glenford soils have a greater silt content than Chagrin series and less gravel composite than Chili series.

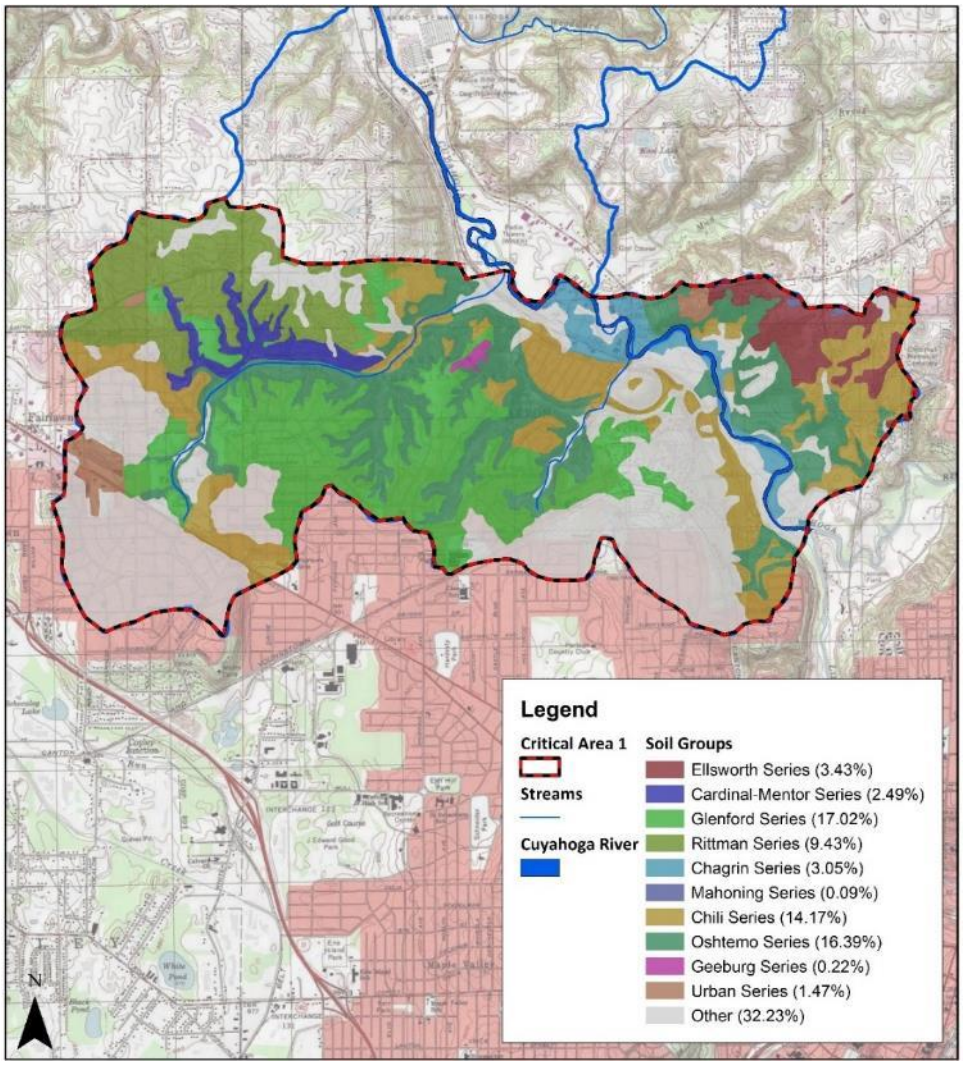

Figure 12: Critical Area 1 - Elevation Map

Glenford series soils are moderately well drained, however, much less so than the next most prevalent series, Oshtemo. The Oshtemo series consists of very deep, well drained soils formed in stratified loamy and sandy deposits on outwash plains, valley trains, moraines, and beach ridges [9]. Urban soils remain relatively infrequently mapped at 1.47%, despite the high level of development and anthropogenic modification within Critical Area 1.

Table 8: Critical Area 1 – Prevalent Soil Series

Soil Group	Acres	%
Glenford Series	784.77	17.02%
Oshtemo Series	755.75	16.39%
Chili Series	653.02	14.17%
Rittman Series	434.51	9.43%
Ellsworth Series	158.29	3.43%

Soil Group	Acres	%
Chagrin Series	140.6	3.05%
Cardinal-Mentor Series	114.76	2.49%
Urban Series	67.87	1.47%
Geeburg Series	10.19	0.22%
Mahoning Series	4.25	0.09%
Other	1486.05	32.23%

Much like the overall Boston Run – Cuyahoga River watershed, Critical Area 1 is highly topographically variable, with elevations ranging from approximately 742 feet above MSL at the Cuyahoga River to approximately 1106 feet above MSL in a residential development south of Rt 18. It is this topography and erodible soils which exacerbate the erosion and degradation within the flowing surface water features of Critical Area 1.

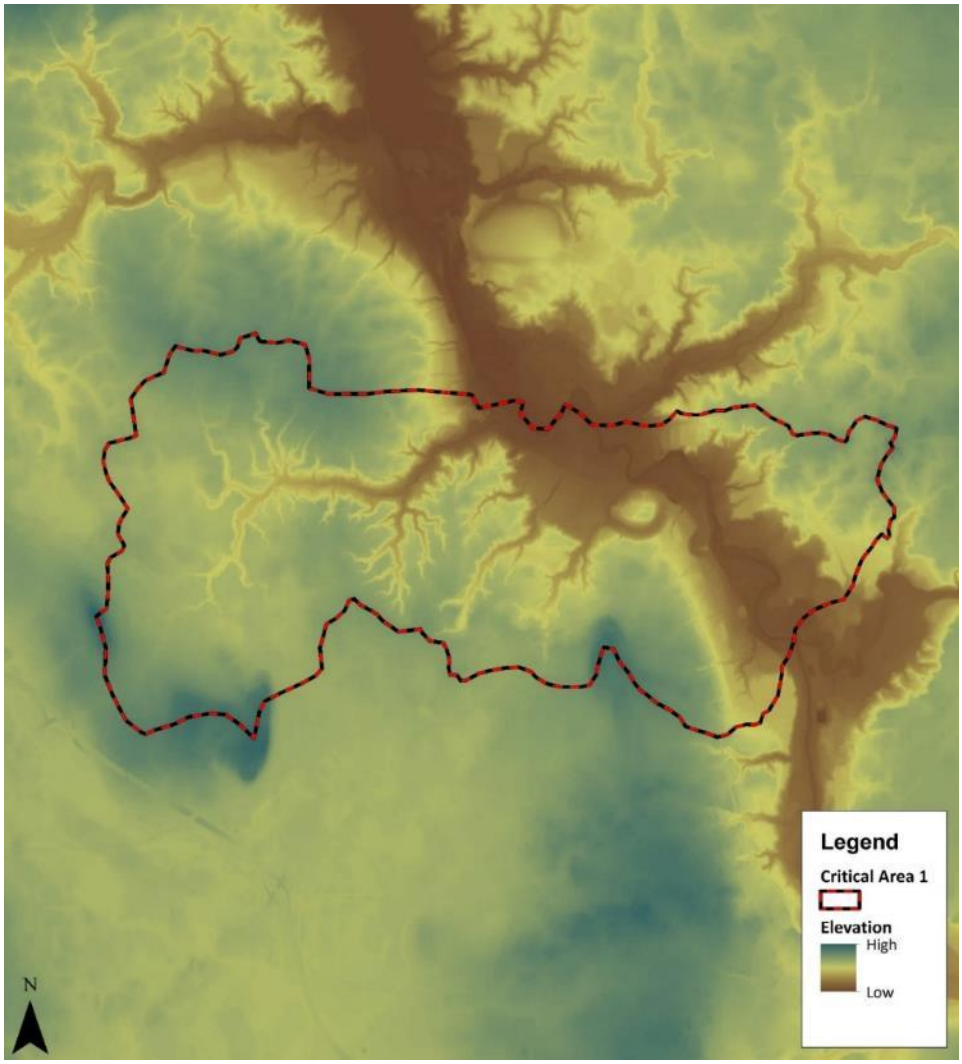

Figure 13: Critical Area 1 - Elevation Map

Biological

More detailed information exists for this Critical Area than for the Boston Run-Cuyahoga watershed with respect to identification of biological and ecological study. Summit Metro Parks has undertaken inventory of wetlands, streams, RTE species, and rare communities within its protected areas.

Wetlands and Streams

During routine park and conservation lands studies, SMP will conduct wetland and stream delineations for the purpose of baseline inventories. Typically, these delineations are not verified by the USACE or OEPA as there are not associated impacts, but they provide crucial information with respect to sensitive habitats, recreational development, and ecosystem integrity. These delineations are conducted to determine boundaries and qualities of wetlands and streams in accordance with the 1987 USACE Delineation manual, subsequent regional supplements, and Ohio EPA regulations. Table 9: Critical Area 1 – Delineated Wetlands contains summary ORAM and acreage information for the SMP-delineated wetlands within the Boston Run-Cuyahoga River watershed on SMP-managed lands. Due to the extensive residential and commercial development within Critical Area 1, wetlands are typically of smaller size and located along stream fringes.

Table 9: Critical Area 1 – Delineated Wetlands

ORAM Category	Count	Combined Acreage
Category 1	11	1.42
Category 2	156	56.75
Category 3	24	27.82
Open Water	11	5.87
Total	**202**	**91.86**

Rare, Threatened, and Endangered Species

SMP maintains a database of all RTE species identified and confirmed through professional and volunteer field efforts. SMP has defined the following identified species within Critical Area 1.

Table 10: Critical Area 1 – Rare, Threatened, and Endangered Species

Scientific Name	Common Name	Area	Category	OH Status[2]	USFWS Status	Global Status
Accipiter striatus	sharp-shinned hawk	Sand Run Metro Park	Bird	C		
Aegolius acadicus	saw-whet owl	Sand Run Metro Park	Bird	S		
Haliaeetus leucocephalus	bald eagle		Bird	N	C	
Mergus merganser	common merganser	Cascade Valley	Bird	S		
Vireo solitarius	blue-headed vireo	Sand Run Metro Park	Bird	S		
Eptesicus fuscus	big brown bat	Cascade Valley	Mammal	C	CN	
Lasiurus borealis	red bat	Cascade Valley	Mammal	C		

[2] N=Noteworthy, P=Protected, S=Special Interest, C=Species of Concern, CN=Candidate Species, E=Endangered

Scientific Name	Common Name	Area	Category	OH Status[2]	USFWS Status	Global Status
Lasiurus cinereus	hoary bat	Cascade Valley	Mammal	C		
Lasiurus cinereus	hoary bat	Cascade Valley	Mammal	C		
Perimyotis subflavus	tri-colored bat	Cascade Valley	Mammal	C		
Peromyscus maniculatus	deer mouse	Sand Run	Mammal	C		
Pseudemys rubiventris	red-bellied cooter	Sand Run	Reptile	N		
Terrapene carolina	eastern box turtle	Cascade Valley	Reptile	C		
Actaea rubra	red baneberry	Sand Run	Vascular Plant	E		
Aralia spinosa	Hercules-club	Sand Run Metro Park	Vascular Plant	N		
Betula populifolia	gray birch	Sand Run Metro Park	Vascular Plant	N		
Bromus nottowayanus	satin brome	Cascade Valley	Vascular Plant	N		G3G5
Cacalia suaveolens	sweet Indian-plantain	Sand Run Metro Park	Vascular Plant	global		G3
Castanea dentata	American chestnut	Sand Run Metro Park	Vascular Plant	N		
Corallorhiza maculata	spotted coralroot	Sand Run Metro Park	Vascular Plant	P		
Cypripedium parviflorum pubescens	large yellow lady's-slipper	Sand Run Metro Park	Vascular Plant	N		
Equisetum x mackaii	roughtoothed scouring rush	Cascade Valley	Vascular Plant			
Helianthemum bicknellii	plains frostweed	Cascade Valley	Vascular Plant	P		
Hydrocotyle americana	American water-pennywort	Sand Run Metro Park	Vascular Plant	N		
Juglans cinerea	butternut	Cascade Valley	Vascular Plant	global		G3G4
Lechea mucronata	hairy pinweed	Cascade Valley	Vascular Plant	P		
Lupinus perennis	wild lupine	Cascade Valley	Vascular Plant	P		
Orchis spectabilis	showy orchis	Sand Run Metro Park	Vascular Plant	N		
Panax quinquefolius	American ginseng	Sand Run Metro Park	Vascular Plant	global		G3G4
Panicum boreale bicknellii	Bicknell's panic-grass	Cascade Valley	Vascular Plant	N		
Platanthera orbiculata	large round-leaved orchid	Sand Run Metro Park	Vascular Plant	N		
Prenanthes crepidinea	nodding rattlesnake-root	Sand Run Metro Park	Vascular Plant	N		
Veratrum viride	false hellebore	Sand Run Metro Park	Vascular Plant	N		
Waldsteinia fragarioides	barren strawberry	Sand Run Metro Park	Vascular Plant	N		

Invasive Species

Invasive species for the Boston Run-Cuyahoga River watershed are noted in Section 2.1.1 Physical and Natural Features. These species are widespread throughout the waterhed, including Critical Area 1. Of particular note in Critical Area 1 is Japanese knotweed, which has been forming dense streambank colonies, shading out other species during the growing season and leaving large swaths of riparian corridor barren after the plants senesced in the autumn. In 2012 and utilizing partial funding from the Great Lakes Restoration Initiative, Summit Metro Parks and Cleveland Metroparks partnered with Youth Employment for Success (YES) to hire at-risk youth as seasonal natural resources management staff. Among other projects, these staff treated approximately 5 linear miles of Sand Run corridor and associated trails for Japanese knotweed.

3.2.1.2 Land Use and Protection

Critical Area 1 comprises the most developed portions of the Boston Run – Cuyahoga River watershed. Compared to the entire watershed, which is approximately 26.29% developed land types and 63.89% forested, Critical Area 1 is 63.48% developed and only 34.05% forested. The Critical Area 1 Land Cover breakdown can be viewed in Table 11: Critical Area 1 – Land Cover Types below.

Table 11: Critical Area 1 – Land Cover Types

Land Cover Type	Boston Run – Cuyahoga River HU		Critical Area 1	
	Acres	%	Acres	%
Open Water	374.35	1.26%	16.23	0.35%
Developed, Open Space	4266.14	14.37%	1239.43	26.89%
Developed, Low Intensity	2636.9	8.88%	1250.74	27.13%
Developed, Medium Intensity	731.58	2.46%	332.59	7.21%
Developed, High Intensity	173.66	0.58%	103.6	2.25%
Barren Land	12.75	0.04%	--	--
Deciduous Forest	17266.85	58.15%	1540.31	33.41%
Evergreen Forest	512.34	1.73%	12.86	0.28%
Mixed Forest	10.09	0.03%	--	--
Shrub / Scrub	69.96	0.24%	5.57	0.12%
Grassland / Herbaceous	714.75	2.41%	65.58	1.42%
Pasture / Hay	1217.57	4.10%	26.48	0.57%
Cultivated Crops	517.76	1.74%	--	--
Woody Wetlands	1165.93	3.93%	16.67	0.36%
Emergent Herbaceous Wetlands	24.81	0.08%	--	--

As discussed in Section 2.3.3, SMP purchased the former Valley View Golf Course in 2016, adding 200 acres of conservation land to a protected corridor stretching between Sand Run Metro Park and the Gorge Metro Park and connecting over 5.5 miles and 1,500 acres. In 2017, SMP volunteers gathered and planted over 117,000 nuts of local genotypes in an effort to restore 100 acres of the former course to ecological functionality. A substantial amount of the effort was concentrated in the 100-year floodplain of the Cuyahoga River, however, the bulk of the riparian corridor restoration activities are planned as a Phase II effort.

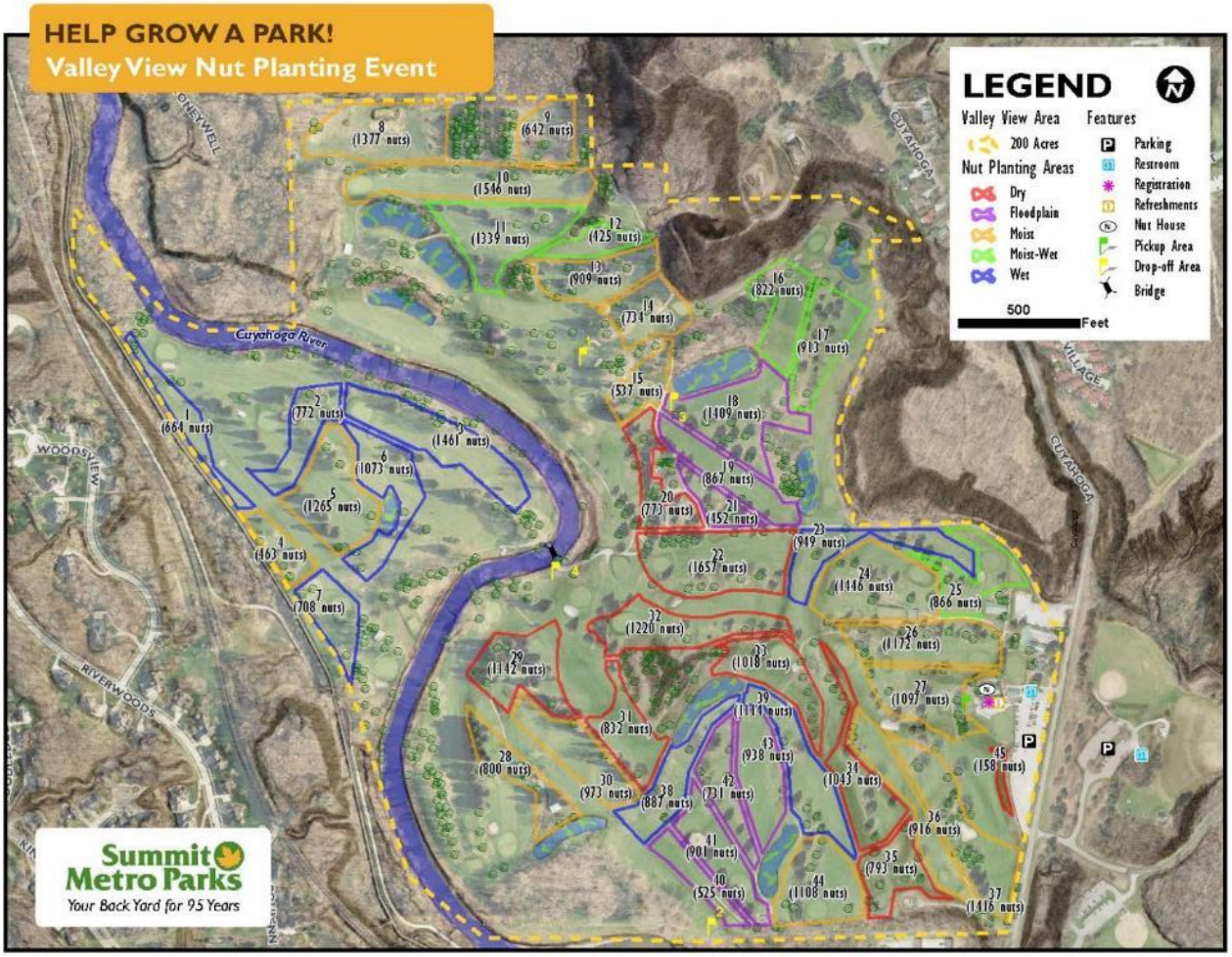

Figure 14: Former Valley View Golf Course, Phase I Restoration Planting Effort [26]

3.2.2 Critical Area 1 Biological Conditions

Two OEPA Aquatic Life Use Monitoring Station exists within Critical Area 1, one of which is in non-attainment of Warmwater Habitat; the sampling station of Sand Run at RM 0.2 (near the confluence with the Cuyahoga River @ RM 39.12). Additionally, EMH&T conducted two QHEI evaluations on Sand Run upstream of the OEPA sampling site in 2013 [27].

Table 12: Critical Area 1 – Aquatic Life Use Monitoring Stations

Sampling Station	Sampling Year	RM	Latitude	Longitude	ALU	IBI Score	ICI Score	QHEI Score
CUYAHOGA R. AT AKRON, 0.5 MI. DST. OLD PORTAGE TRAIL	2008	39.7	41.1386	-81.5528	Full WMH	36 Marginally Good	42 Very Good	81
SAND RUN @ RIVERVIEW RD N OF AKRON	1996	0.2	41.13864	-81.5618	Non WMH	26 Marginally Good	N/A Unsampled	59

Sampling Station	Sampling Year	RM	Latitude	Longitude	ALU	IBI Score	ICI Score	QHEI Score
SAND RUN UPSTREAM OF SAND RUN PARKWAY FORD (conducted by EMH&T)	2013	0.65	41.1350	-81.5876	N/A	N/A	N/A	61.5
SAND RUN UPSTREAM ADJACENT TO SAND RUN PARKWAY (conducted by EMH&T)	2013	1.4	41.1329	-81.5877	N/A	N/A	N/A	51.5

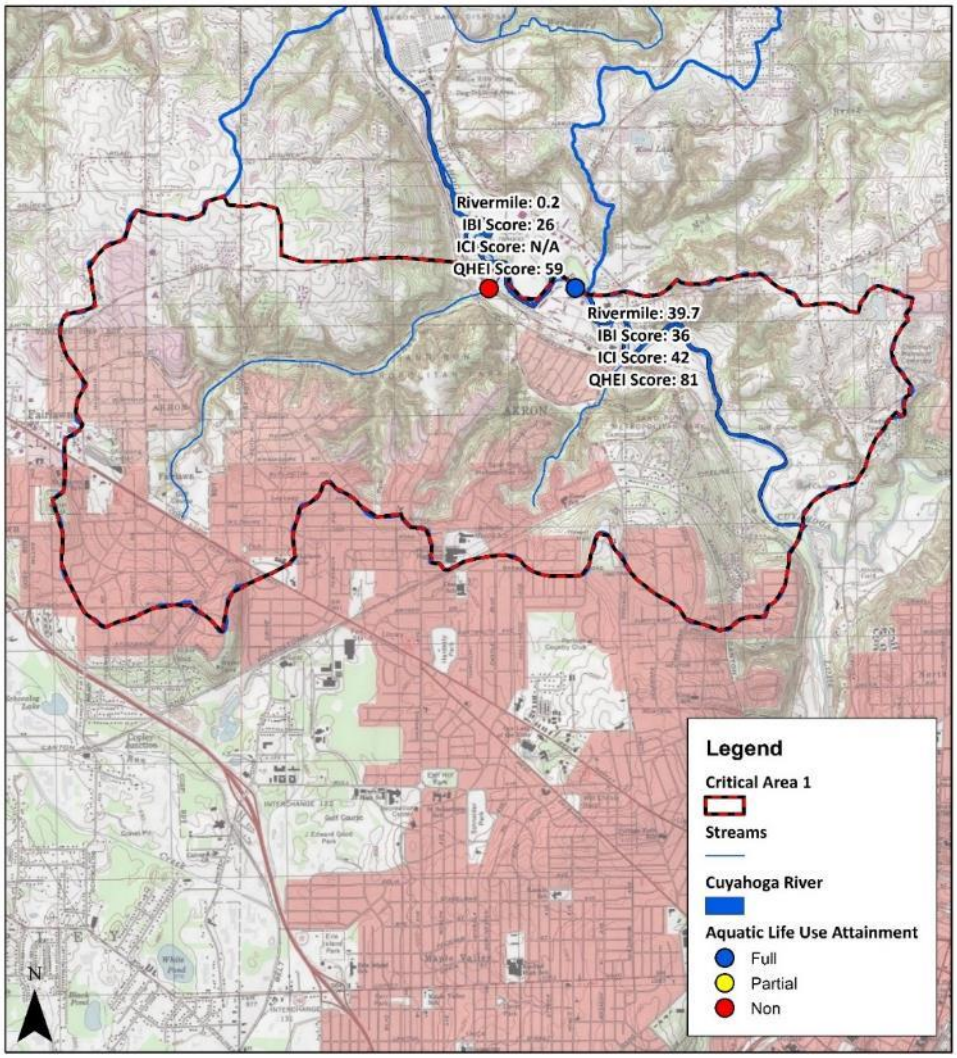

Figure 15: Critical Area 1 - Aquatic Life Use Monitoring Stations

3.2.3 Critical Area 1 Impairment Causes and Associated Sources

The main waterway and largest tributary to the Cuyahoga River within Critical Area 1 is Sand Run. The dominant habitat impairments indicate a stream with too much channelization to absorb the flashy hydrologic inputs from an urbanized watershed. Excessive sediment loads overwhelm the stream's processing ability, resulting in poor substrate conditions and a turbid water column. The habitat

impairments noted by the OEPA in the 1996 QHEI of Sand Run were a recovering channel, fast current, sparse/no cover, fair/poor channel development, high/moderate overall embeddedness, and high/moderate riffle embeddedness. Similar impairments were noted in the 2013 QHEIs performed by EMH&T.

As noted in the OEPA's Biological and Water Quality Study of the Cuyahoga River and Selected Tributaries [28]:

> ***Sand Run (Confluence RM 39.12)***
> *Habitat in Sand Run was impaired by urban runoff and storm water from Akron and Fairlawn. The channel was sinuous and developed, contained a variety of substrates of differing sizes, and was bordered by a wide riparian corridor. However, flashy stream flows due to storm water severely eroded the banks and substrates were extensively embedded. Consequently, the habitat was marginally suited to warmwater habitat faunas. In addition to urban development in the headwaters, about five to seven small low-head dams are also located along the length of the stream. The dams could pose a barrier to fish migration and recolonization and should be evaluated for removal. Fish communities in Sand Run were severely impacted by urban storm water runoff from the city of Fairlawn. Effects of flashy flows were evident in severe bank erosion, embedded substrates, and a destabilized channel. As such, only six species were collected, of which three were tolerant and composed 97% of the community. Macroinvertebrate collections near the mouth found only fifteen total taxa and three EPT taxa in very low densities.*

In addition to the causes and sources of impairment noted for the Boston Run – Cuyahoga River watershed as a whole, targeted causes and sources have been identified for Critical Area 1. Again, these impairments are a direct result of the upstream urbanization and encroachment on riparian space.

Causes of Impairment	*Sources of Impairment*
direct habitat alteration	residential effects
particle distribution (embeddedness)	channelization
sedimentation / siltation	

Image 7: Critical Area 1 - Fish Passage Barrier on Sand Run, Mingo Pavilion Road Crossing

Sand Run within Sand Run Metro Park has a number of notable barriers to fish passage, as exhibited above in the dam directly upstream of the Mingo Pavilion access road and at the Sand Run Parkway ford. A third notable barrier is downstream at the Cuyahoga Valley Scenic Railroad Bridge. These barriers each represent a 2-3' stream elevation change, caused by years of flashy stream flows and erosion, and form a major impairment to aquatic life use. As noted by the OEPA during the 1996 aquatic life assessment, only 3 species (pollution tolerant) comprised 97% of the individuals captured during the IBI assessment. This is not atypical for a flashy, impaired stream with urbanized influences [29].

Image 8: Critical Area 1 - Sand Run Parkway / Sand Run Ford

3.2.4 Critical Area 1 Goals and Objectives

Goal 1: Maintain IBI score of at least 24 at Sand Run @ Riverview Rd N of Akron (RM 0.2).

ACHIEVED (but at risk)* Site currently has an IBI score of 24, last monitored over 20 years ago.

Goal 2: Maintain QHEI score of at least 59 at Sand Run @ Riverview Rd N of Akron (RM 0.2).

ACHIEVED: Site currently has a *QHEI score of 59.*

Goal 3: Achieve ICI score of at least 35 (or the qualitative equivalent) at Sand Run @ Riverview Rd N of Akron (RM 0.2).

UNKNOWN: No ICI has been conducted at this site.

Goal 4: Raise and Maintain QHEI score of 64.5 at Sand Run Upstream of Sand Run Parkway (RM 1.4).

NOT ACHEIVED: This site has a QHEI score of 51.5

Goal 5: Maintain QHEI score of 65 at Sand Run Upstream of Sand Run Parkway Ford (RM 0.65)

NOT ACHEIVED: This site has a QHEI score of 61.5

To achieve these goals for Critical Area 1, the following objectives have been identified:

1. Remove, where practicable, three current barriers to aquatic life passage with those that allow passage or raising the grade of the blocked waterways incrementally to those structures.
2. Replace one inadequately functioning culvert to allow for more natural and unrestricted flow of stream and stormwater while maintaining structural integrity of the adjacent infrastructure.
3. Stabilize approximately 1,500 feet of rapidly eroding slopes and massive erosion at crucial points for the entirety of Sand Run within Sand Run Metro Park Boundaries.
4. Restore floodplain functionality and bank integrity to approximately 10,000 feet of the Cuyahoga River
5. Where practicable, restore and enhance 50 acres of degraded wetlands to functionality.
6. Remove/disable 20,000 feet of drain tile on developed lands.
7. Decommission and remove approximately 2,650 feet of pavement between North Portage Path and Merriman Road.
8. Daylight approximately 1,500 feet of culverted stream to natural functionality and morphology in Sand Run Metro Park between North Portage Path and Merriman Road.

As these objectives are implemented, water quality monitoring (during restoration and post-construction monitoring) will be conducted to determine progress toward meeting the identified goals (i.e., water quality standards). These objectives will be reevaluated and modified if determined to be necessary.

4 PROJECTS AND IMPLEMENTATION STRATEGY

4.1 PROJECTS AND IMPLEMENTATION STRATEGY OVERVIEW

At the time of this writing, two actionable restoration projects are ready for implementation using §319 funding; Sand Run Restoration Project (mainstem and unnamed tributary within Sand Run Metro Park). Below is an overview table with actionable and with other potential, although as of yet unplanned, projects to enhance or restore functionality and habitat within the Boston Run-Cuyahoga River watershed. Because the attainment status is based on biological conditions, it will be necessary to periodically re-evaluate the status of Critical Area 1 to determine if the implemented projects are sufficient to achieve restoration—ongoing research and monitoring by various entities including, but not limited to, Ohio EPA, Summit Metro Parks, and other stakeholders within and adjacent to Critical Area 1 may provide further information and clarification on the biological conditions and trends influencing this area. Time is an important factor to consider when measuring project success and overall status. Biological systems in some cases can show positive or negative response in a reasonable time frame. But others may take longer to show recovery. There may also be reasons other than nonpoint source pollution for the impairment.

Table 13: Projects and Implementation Strategies Overview Table

Boston Run - Cuyahoga River Watershed (HUC 041100020405)								
Applicable Critical Area	Goal	Objective	Project #	Project Title *(Criterion g)*	Lead Organization *(Criterion d)*	Time Frame *(Criterion f)*	Estimated Cost *(Criterion d)*	Potential/Actual Funding Source *(Criterion d)*
Altered Streams and Habitat Restoration Strategies								
1	1-3	1-3	1	Sand Run Restoration Project[3]	Summit Metro Parks	2-3 years	$3.57M	319; Clean Ohio; HMGP; SMP match
1	N/A	N/A	2	Valley View Golf Course, Phase II[4]	Summit Metro Parks	2-3 years	~$2.3M	GLRI; Clean Ohio; SMP match
1	1-3	1-3	3	Sand Run Parkway Partial Decommissioning and Stream Daylighting	Summit Metro Parks	8-10 years	Unknown	Unknown

[3] Actionable project ready for funding and implementation

[4] This Valley View Golf Course, Phase II Project is currently fully funded through several sources. However, as this Project evolves, additional funding through a §319 Grant may be sought.

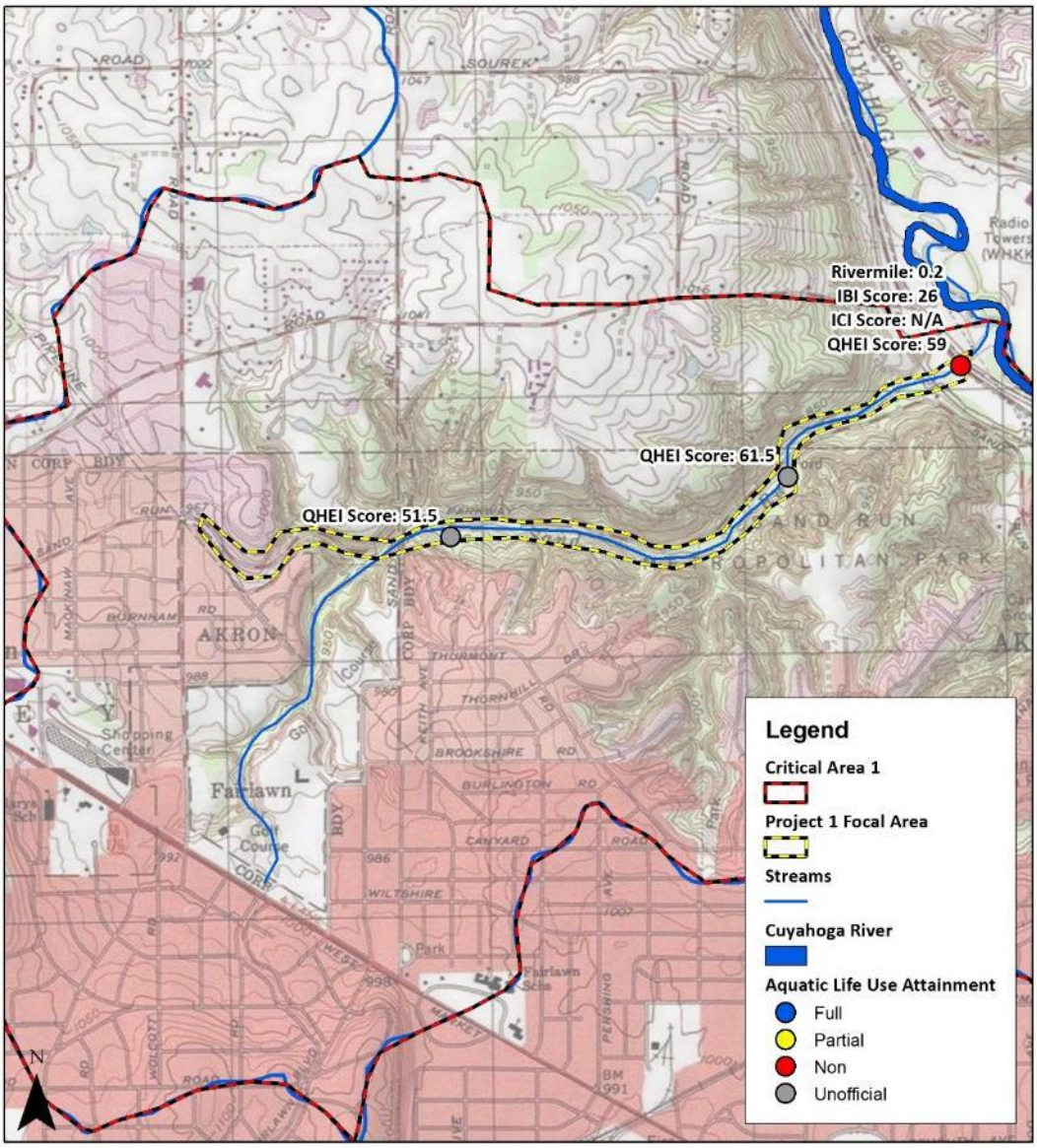

Figure 16: Critical Area 1 - Project 1 Location

4.1.1 Project Summary Sheet – Sand Run Restoration Project

Nine Element Criterion	Information Required	Explanation
Critical Area #1 – Sand Run Restoration Project		
criterion d	Project Lead Organization and Partners	Summit Metro Parks
criterion c	HUC-12 and Critical Area	Boston Run-Cuyahoga River (041100020405) Critical Area #1 (Sand Run within the City of Fairlawn, and the City of Akron)
criterion c	Location of Project	Sand Run Metro Park
n/a	Which strategy is being addressed by this project?	Urban sediment and nutrient reduction, restore streams using natural design methods, restoring functionality to burdened culverts, strategies for restoring and protecting habitat, restoring natural flow, riparian management strategies
criterion f	Project Schedule and Duration	Short-term (2-3 years) construction with ongoing monitoring and public education/outreach
criterion g	Short Description	The Sand Run Restoration Project will be a series of smaller project components located entirely within Sand Run Metro Park and focus on restoring hydraulic capacity, restoring and protecting habitat, and restoring upstream passage for aquatic life to the flashy, urbanized Sand Run through the replacement of one inadequately-functioning culvert, the removal or remediation of three barriers to aquatic life passage, and the stabilization of approximately 1,000 linear feet of Sand Run within Sand Run Metro Park.
criterion g	Project Narrative	Sand Run stream flows through Sand Run Metro Park in the cities of Akron and Fairlawn. Sand Run stream is the predominate aquatic feature of the park with the remainder of the landscape composed of steep sandy slopes and terraces. The stream has experienced a host of impacts associated with the urbanized nature of the surrounding watershed. Watershed development in the 1950's through the 1990's has resulted in increased stormwater flowing through Sand Run Park. The stream has downcut several feet in the ensuing decades and is moving laterally. Headcuts are moving up the cliff walls along the smaller streams and resulting in mass slumping of soil. While stream erosion is a natural process, the rate of erosion has accelerated beyond natural rates and is threatening the natural areas of the park.

Nine Element Criterion	Information Required	Explanation
Critical Area #1 – Sand Run Restoration Project		

		In their 1999 evaluation of the Cuyahoga drainage, the Ohio EPA notes that Sand Run is impacted by urban runoff and storm sewers primarily from the City of Akron (Ohio EPA, 1999 [28]). Ohio EPA notes severe streambank erosion and highly embedded substrates as biological impairments to water quality. In addition, several lowhead dams along the mainstem of the stream are acting as fish migration barriers and lowering the biological potential of the waterway.
		
		To address this, Summit Metro Parks funded a stream improvement and restoration plan. The plan includes the protection of park infrastructure (roads, bridges, buildings) and includes stream restoration techniques to improve habitat for fish and wildlife. The Sand Run Restoration Project provides for the 1) Restoration of instream habitat, 2) landscape level mitigation techniques to intercept stormwater at the source BEFORE it reaches the park, and 3) A community outreach program to better educate and engage citizens in the stewardship of our water quality resources. The Sand Run Restoration Project involves a series separate restoration activities:
		• Restoration of approximately 1000' of instream habitat through:
		  ○ Bank stabilization; slope regrading with rock vanes
		  ○ Bank stabilization; slope regrading
		  ○ Restoration of natural, meandering channel
		• Remove or regrade 3, depending on feasibility, large impairments to aquatic life passage through the use of Newbury riffles, a slotted concrete ford across Sand Run Parkway, and a custom riffle structure.
		• Removing an inadequately functioning round culvert and replacing with a 3-sided box culvert to restore natural substrate and aquatic life passage

criterion d	Estimated Total Cost	**Project Total: $3,565,790** **Please see Appendix C for an attached Benefit Cost Analyses prepared for the Sand Run Restoration Project for a detailed explanation of project costs.**
criterion d	Possible Funding Source(s)	319 Grant, Clean Ohio Grant, Hazard Mitigation Grant Program, local match from Summit Metro Parks. NOTE: Summit Metro Parks has already been awarded a 2-million dollar grant from Clean Ohio Conservation Fund.

Nine Element Criterion	Information Required	Explanation
Critical Area #1 – Sand Run Restoration Project		
criterion a	Identified Causes and Sources	Causes of Impairment • fish passage barrier • direct habitat alterations • nutrients • particle distribution (embeddedness) • sedimentation Sources of Impairment • dam or impoundment • loss of riparian habitat • golf courses • residential development / urbanization • channelization
criteria b & h	Part 1: How much is needed to remove the NPS Impairment for the whole of Critical Area #1?	Critical Area 1 is currently in attainment, but at risk. Implementing the Objectives discussed in Section 3.2.4 will help to ensure it remains in attainment.
	Part 2: How much of the needed improvement for Critical Area #1 is *estimated* to be accomplished by this project?	This project represents a much-needed large restoration and stabilization project within the Boston Run-Cuyahoga River watershed's Critical Area 1. It is estimated that the Sand Run Restoration Project will meet 100% of Objectives 1 (Remove, where practicable, three current barriers to aquatic life passage) and 2 (Replace one inadequately functioning culvert) and meet 67% of Objective 3 (stabilize 1,000 of 1,500 feet needed of Sand Run)
	Part 3: Load reduced?	According to the EPA Region 5 model, the restoration activities and subsequent best management practices proposed by the Sand Run Restoration Project will remove an estimated 440 lbs of sediment/year, 440 lbs of phosphorus/year, and 882 lbs of nitrogen/year
criterion i	How will the effectiveness of this project in addressing NPS Impairment be measured?	Summit Metro Parks will coordinate with agency partners like Northeast Ohio Regional Sewer District and Ohio EPA to assist with pre and post project monitoring. Staff from the Ohio EPA-DSW Ecological Assessment Unit will perform both pre- and post-project monitoring. In addition, the future sampling sites may also be monitored (as part of the State's ongoing surface water monitoring program cycle) to determine progress towards attaining State of Ohio WQS (through IBI, MIwb, ICI, and QHEI).
criterion e	Information and Education	SMP staff will conduct extensive public education efforts for the project, including conducting project tours, field days and workshops, clean-ups and press releases. The site will be utilized as a part of our volunteer Citizen Science programs

Nine Element Criterion	Information Required	Explanation
Critical Area #1 – Sand Run Restoration Project		
		and it will be featured in the "Green Islands" (SMP publication) article and on the stream restoration section of the SMP website (www.summitmetroparks.org).

4.1.2 Project Summary Sheet – Valley View Golf Course Restoration, Phase II

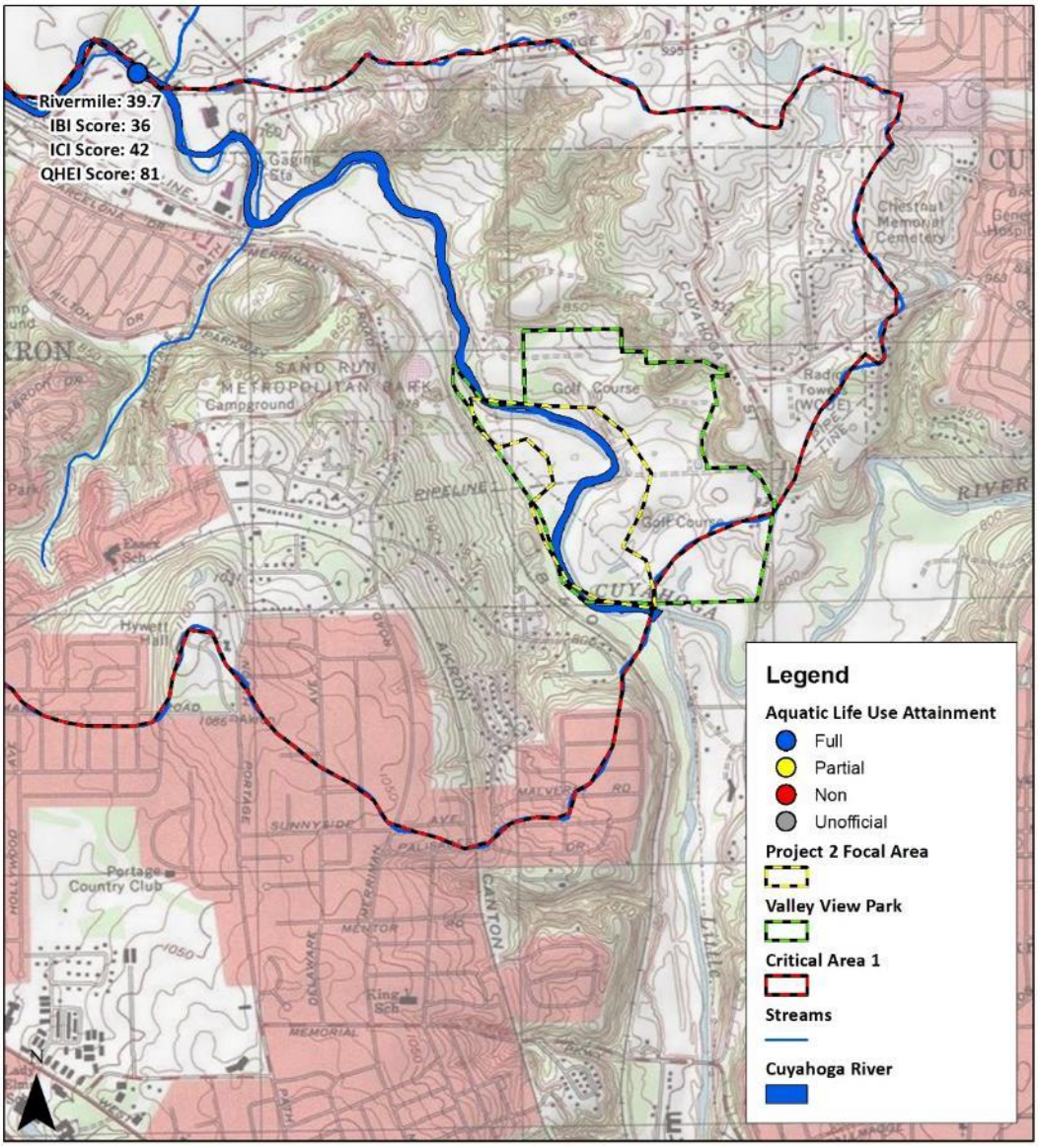

Figure 17: Critical Area 1 - Project 2 Location

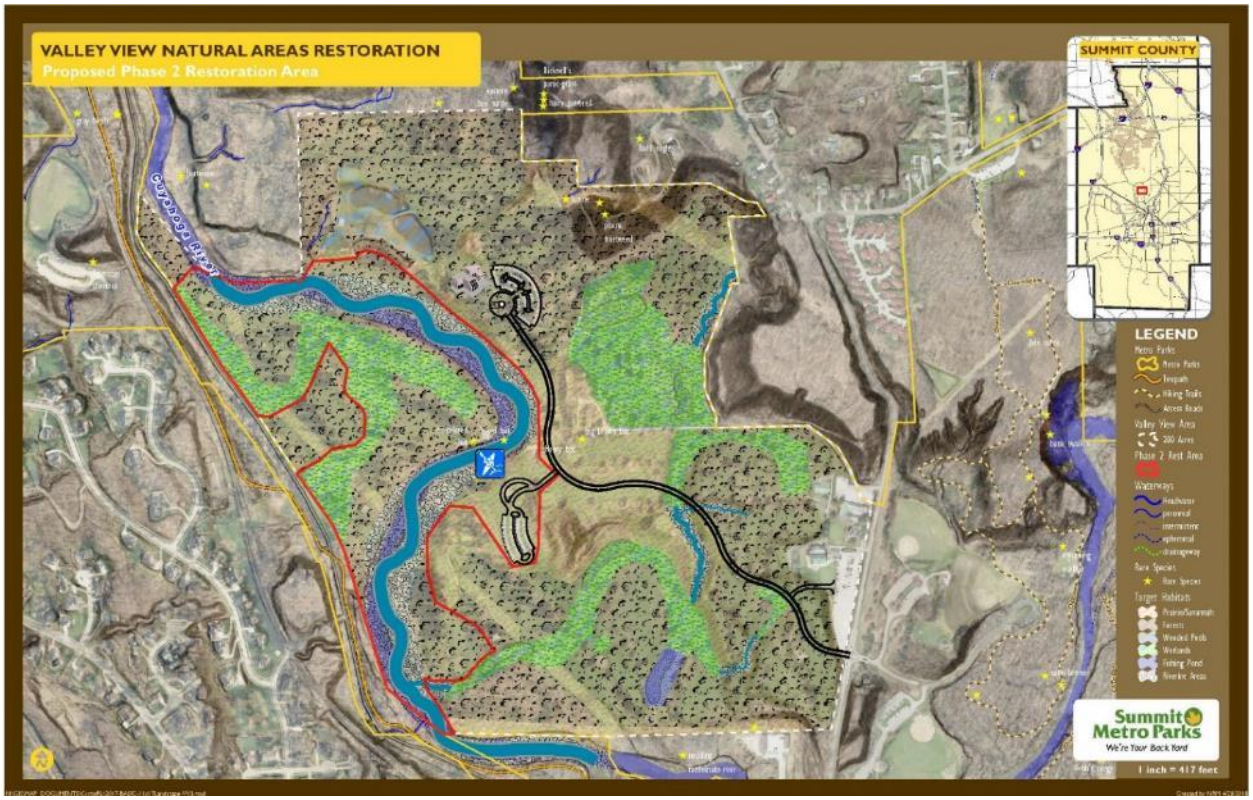

Figure 18: Former Valley View Golf Course, Proposed Phase II Restoration Effort [30]

Nine Element Criterion	Information Required	Explanation
Critical Area #1 – Valley View Golf Course Restoration, Phase II		
criterion d	Project Lead Organization and Partners	Summit Metro Parks
criterion c	HUC-12 and Critical Area	Boston Run-Cuyahoga River (041100020405) Critical Area #1 (Sand Run within the City of Fairlawn, and the City of Akron
criterion c	Which strategy is being addressed by this project?	Restore streams using natural design methods, restoring natural hydrology by disabling drain tile, strategies for restoring and protecting habitat, restoring natural flow, riparian management strategies, floodplain connectivity and enhancement.
criterion f	Project Schedule and Duration	Short-term (2-3 years) construction and restoration with ongoing monitoring and public education/outreach
criterion g	Short Description	The Valley View Golf Course Restoration, Phase II Project will entail approximately:

Nine Element Criterion	Information Required	Explanation
Critical Area #1 – Valley View Golf Course Restoration, Phase II		
		• 5,000-foot stream restoration (Cuyahoga River) • 11-acre wetland restoration • 5,000-feet+ drain tile daylighting/disabling • 5-acre exotic species removal • 40-acre native seeding • 18-acre reforestation
criterion g	Project Narrative	The Valley View Golf Course Restoration, Phase II Project is listed as a "Habitat Creation/Restoration Project (Cuyahoga River)" of the *Highest Priority* [24]. This restoration project will actively work to remove one of the main sources threatening continued attainment status in Critical Area 1; the Valley View Golf Course. Fallow for several years prior, the course was acquired by Summit Metro Parks in 2016. A Phase I restoration project was initiated in 2017 and Phase II is planned for 2020. The former Valley View golf course was acquired by Summit Metro Parks in 2016 after several years of disuse. Constructed over 50 years ago, the 194-acre property now physically connects Sand Run Metro Park, Cascade Valley Metro Park, and Gorge Metro Park, connecting over 5.5 miles and 1,500 acres of natural space. Typical of golf courses constructed at that time, Valley View was built with more than 20,000 feet of drain tile and minimal, if any, buffers for streams and wetlands. This includes the Cuyahoga River, which, over time, has undergone significant bank erosion within the course, separating the river from its historical floodplain. To address this, Metro Parks funded a restoration plan in two phases. The Valley View Golf Course Restoration, Phase II Project aims to restore floodplain functionality and bank integrity to approximately 5,000 linear feet of the Cuyahoga River by reducing the entrenchment and channelization of the river, historically separated from its functional floodplain for flood control and expansion of arable or buildable land. Banks will be sloped and graded as necessary, channel protection will be installed to enhance stability until natural processes return post-construction, and habitat structures will be installed for aquatic species. Additionally, this project will involve the restoration and enhancement of approximately 11-acres of wetlands to more natural, unmanicured conditions, 5 acres of exotic and invasive species removal, 40 acres of native seeding, and reforest 18 acres as well with live stakes and potentially young trees. A compliment to the Phase I restoration project which took place in 2016 in the section of property across the Cuyahoga River.

Nine Element Criterion	Information Required	Explanation
Critical Area #1 – Valley View Golf Course Restoration, Phase II		
		As golf courses are one of the main identified sources of impairment in the Boston Run-Cuyahoga River watershed, not only restoring the former Valley View golf course to pre-construction conditions but allowing the Cuyahoga River to access dozens of acres of functional floodplain is a small, but vitally important component for the ecological health of the watershed. Water quality in the middle Cuyahoga River has increased greatly over the past few decades. This stretch of the river is particularly noteworthy for its productive smallmouth bass fishery. With continued improvements, most notably the removal of the Canal Diversion Dam and the Gorge Dam, this section of the Cuyahoga River will once again be available to migratory species of Lake Erie fish including steelhead, musky, and walleye. Even the endangered lake sturgeon will once again have access to the clean gravel substrates of these historical spawning sites.
criterion d	Estimated Total Cost	$2,300,000 [24] Include cost breakdown of costs detailed below. Note that this Project, at the time of this writing, is fully funded through several other funding sources without §319 funding, although §319 funding may be sought if the scope or extent of the Project necessitates further funding.
criterion d	Possible Funding Source(s)	GLRI grant, Clean Ohio grant, Summit Metro Parks local match
criterion a	Identified Causes and Sources	Causes of Impairment • direct habitat alterations • nutrients • particle distribution (embeddedness) • sedimentation Sources of Impairment • loss of riparian habitat • golf courses • residential development / urbanization • channelization
criteria b & h	Part 1: How much is needed to remove the NPS Impairment for the whole of Critical Area #1?	Critical Area 1 is currently in attainment, but at risk. Implementing the Objectives discussed in Section 3.2.4 will help to ensure it remains in attainment.
	Part 2: How much of the needed improvement for Critical Area #1 is *estimated* to be	This project represents a much-needed large restoration and stabilization project within the Boston Run-Cuyahoga River watershed's Critical Area 1. It is estimated that the Valley View Gold Course Restoration, Phase II Project will meet:

Nine Element Criterion	Information Required	Explanation
Critical Area #1 – Valley View Golf Course Restoration, Phase II		
	accomplished by this project?	• 100% of Objective 4 (restore floodplain functionality to 5,000 out of 10,000 feet needed to the Cuyahoga River) • A further 22% of Objective 4 (restore 11 of 50 acres of wetlands) as approximately 22 acres of wetland have been already restored by Valley View Golf Course Restoration Phase I Project. This additional restoration work would bring the total to 66% progress of this Objective. • 67% of Objective 3 (stabilize 1,000 of 1,500 feet needed of Sand Run)
	Part 3: Load reduced?	According to the EPA Region 5 model, the restoration activities and subsequent best management practices proposed by the Valley View Golf Course Restoration, Phase II Project will remove an estimated 697 tons of sediment/year, 801.2 lbs of phosphorus/year, and 1,602.9 lbs of nitrogen/year
criterion i	How will the effectiveness of this project in addressing NPS Impairment be measured?	Summit Metro Parks will coordinate with agency partners like Northeast Ohio Regional Sewer District and Ohio EPA to assist with pre and post project monitoring. Staff from the Ohio EPA-DSW Ecological Assessment Unit will perform both pre- and post-project monitoring. In addition, the future sampling sites may also be monitored (as part of the State's ongoing surface water monitoring program cycle) to determine progress towards attaining State of Ohio WQS (through IBI, MIwb, ICI, and QHEI).
criterion e	Information and Education	SMP staff will conduct extensive public education efforts for the project, including conducting project tours, field days and workshops, clean-ups and press releases. The site will be utilized as a part of our volunteer Citizen Science programs and it will be featured in the "Green Islands" (SMP publication) article and on the stream restoration section of the SMP website (www.summitmetroparks.org).

5 REFERENCES

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Appendix A

Boston Run-Cuyahoga River Watershed – Documented Rare Species, Geologic Features, High Quality Plant Habitats, and Animal Assemblages

Category	Managed Area	OH Status[5]	USFWS Status
Animal Assemblage			
Animal Assemblage	HARDY ROAD LANDFILL		
Geological Feature	CUYAHOGA VALLEY NATIONAL PARK		
Geological Feature	CUYAHOGA VALLEY NATIONAL PARK		
Invertebrate Animal	HAMPTON HILLS METRO PARK	T	
Nonvascular Plant	CUYAHOGA VALLEY NATIONAL PARK	T	
Terrestrial Community - Other Classification	CUYAHOGA VALLEY NATIONAL PARK-STUMPY BASIN		
Terrestrial Community - Other Classification	CUYAHOGA VALLEY NATIONAL PARK-STUMPY BASIN		
Vascular Plant	CUYAHOGA VALLEY NATIONAL PARK	P	
Vascular Plant		P	
Vascular Plant	CUYAHOGA VALLEY NATIONAL PARK-STUMPY BASIN	P	
Vascular Plant	CUYAHOGA VALLEY NATIONAL PARK-STUMPY BASIN	P	
Vascular Plant	CUYAHOGA VALLEY NATIONAL PARK-STUMPY BASIN	P	
Vascular Plant	COLUMBIA RUN CONSERVATION AREA	P	
Vascular Plant	CUYAHOGA VALLEY NATIONAL PARK	T	
Vascular Plant	CUYAHOGA VALLEY NATIONAL PARK	P	
Vascular Plant	CUYAHOGA VALLEY NATIONAL PARK	T	
Vascular Plant	CUYAHOGA VALLEY NATIONAL PARK	T	
Vascular Plant	CUYAHOGA VALLEY NATIONAL PARK	E	
Vascular Plant	DEEP LOCK QUARRY METRO PARK	P	
Vascular Plant	CUYAHOGA VALLEY NATIONAL PARK	P	
Vascular Plant	CUYAHOGA VALLEY NATIONAL PARK	E	
Vascular Plant		P	
Vascular Plant	DEEP LOCK QUARRY METRO PARK	P	
Vascular Plant	CUYAHOGA VALLEY NATIONAL PARK-STUMPY BASIN	P	
Vascular Plant	DEEP LOCK QUARRY METRO PARK	P	
Vascular Plant	HAMPTON HILLS METRO PARK	P	
Vascular Plant		P	
Vascular Plant	CUYAHOGA VALLEY NATIONAL PARK	P	
Vascular Plant	SAND RUN METRO PARK	P	
Vascular Plant	CUYAHOGA VALLEY NATIONAL PARK	P	
Vascular Plant	BRECKSVILLE RESERVATION	P	
Vascular Plant		T	
Vascular Plant	CUYAHOGA VALLEY NATIONAL PARK	T	
Vascular Plant	RIDING RUN CONSERVATION AREA	P	
Vascular Plant	CUYAHOGA VALLEY NATIONAL PARK-STUMPY BASIN	E	
Vascular Plant	CUYAHOGA VALLEY NATIONAL PARK-STUMPY BASIN	P	
Vascular Plant	CUYAHOGA VALLEY NATIONAL PARK-STUMPY BASIN	E	

[5] E = endangered, T = threatened, P = potentially threatened, SC = species of concern, SI = special interest, FE = federal endangered, FT = federal threatened, X=Extirpated, and A = recently added to inventory, status not yet determined

Category	Managed Area	OH Status[5]	USFWS Status
Vascular Plant		P	
Vascular Plant	CUYAHOGA VALLEY NATIONAL PARK	P	
Vascular Plant	SAND RUN METRO PARK	P	
Vertebrate Animal	CUYAHOGA VALLEY NATIONAL PARK	SI	
Vertebrate Animal	CUYAHOGA VALLEY NATIONAL PARK	E	
Vertebrate Animal	CUYAHOGA VALLEY NATIONAL PARK	E	
Vertebrate Animal		F	FSC
Vertebrate Animal	CUYAHOGA VALLEY NATIONAL PARK	T	
Vertebrate Animal	CUYAHOGA VALLEY NATIONAL PARK	SC	
Vertebrate Animal	HAMPTON HILLS METRO PARK	E	
Vertebrate Animal	CUYAHOGA VALLEY NATIONAL PARK	E	
Vertebrate Animal	SAND RUN METRO PARK	SC	
Vertebrate Animal	HARDY ROAD LANDFILL	E	
Vertebrate Animal	CUYAHOGA VALLEY NATIONAL PARK	T	
Vertebrate Animal	COLUMBIA RUN CONSERVATION AREA	SI	
Vertebrate Animal	DEEP LOCK QUARRY METRO PARK	SI	
Vertebrate Animal		X	
Vertebrate Animal	CUYAHOGA VALLEY NATIONAL PARK	SC	
Vertebrate Animal	CUYAHOGA VALLEY NATIONAL PARK	SI	

Appendix B

Boston Run-Cuyahoga River Watershed – Dams

NAME	PERMIT NUMBER	CLASS	OWNER	OWNER TYPE	STREAM	PURPOSE	STRUCTURE TYPE
CUYAHOGA RIVER CHANNEL DAM	N/A	ABANDON			CUYAHOGA RIVER		
CAMP MANATOC LAKE DAM	N/A	ABANDON	Great Trail Council, BSA	PRIVATE	SALT RUN	RECREATION, PRIVATE	N/A
WOODRIDGE RETENTION DAM	EXEMPT	EXEMPT	Woodridge Local School District	PUBLIC, LOCAL		STORMWATER RETENTION	
WHARTON POND DAM	N/A	EXEMPT	Earl W. Wharton	PRIVATE	TRIBUTARY TO DICKERSON RUN	RECREATION, PRIVATE	EARTHFILL
AKRON METROPOLITAN PARK POND DAM	EXEMPT	EXEMPT	Metro Parks Serving Summit County	PUBLIC, LOCAL	TRIBUTARY TO SAND RUN	RECREATION, PUBLIC	
SAND RUN METROPOLITAN PARK LAKE DAM	EXEMPT	EXEMPT	Metro Parks Serving Summit County	PUBLIC, LOCAL	TRIBUTARY TO CUYAHOGA RIVER	RECREATION, PUBLIC	
UNKNOWN	EXEMPT	EXEMPT			TRIBUTARY TO CUYAHOGA RIVER		EARTHFILL
UNKNOWN	EXEMPT	EXEMPT			TRIBUTARY TO SLIPPER RUN		EARTHFILL
SAALFIELD POND NO. 3 DAM		EXEMPT	Albecht Saalfield	PRIVATE	TRIBUTARY TO CUYAHOGA RIVER	FLOOD CONTROL, LOCAL; RECREATION, PRIVATE	EARTHFILL
SAALFIELD POND NO. 4 DAM		EXEMPT	Albecht Saalfield	PRIVATE	TRIBUTARY TO CUYAHOGA RIVER	RECREATION, PRIVATE	EARTHFILL
TAMSIN PARK LAKE DAM	EXEMPT	EXEMPT	Robert Cruty	PRIVATE	TRIBUTARY TO SALT RUN	RECREATION, PRIVATE	
TAMSIN PARK LAKE DAM	EXEMPT	EXEMPT	Robert Cruty	PRIVATE	TRIBUTARY TO SALT RUN	RECREATION, PRIVATE	
LAKE BUTLER DAM	N/A	I	Great Trail Council, BSA	PRIVATE	HASKELL RUN	RECREATION, PRIVATE	EARTHFILL
LAKE LITCHFIELD DAM	73-070	I	Great Trail Council, BSA	PRIVATE	RITCHIE RUN	RECREATION, PRIVATE	EARTHFILL
VIRGINIA KENDALL PARK DAM	N/A	II	USDI, National Park Service	PUBLIC, FEDERAL	SALT RUN	RECREATION, PUBLIC	EARTHFILL
GUND POND NO. 2 DAM	EXEMPT	III	Agnes Gund	PRIVATE	TRIBUTARY TO CUYAHOGA RIVER	RECREATION, PRIVATE	EARTHFILL
GUND POND NO. 1 DAM	EXEMPT	III	Agnes Gund	PRIVATE	TRIBUTARY TO CUYAHOGA RIVER	RECREATION, PRIVATE	EARTHFILL
BELL LAKE DAM	EXEMPT	III	Multiple Owners - 1114-018	PRIVATE	DICKERSON RUN	RECREATION, PRIVATE	EARTHFILL
ARMINGTON DAM NO. 1	N/A	III	USDI, National Park Service	PUBLIC, FEDERAL	SALT RUN	FLOOD CONTROL, FEDERAL	EARTHFILL

NAME	PERMIT NUMBER	CLASS	OWNER	OWNER TYPE	STREAM	PURPOSE	STRUCTURE TYPE
LOOMIS LAKE DAM		III-EXE	Girl Scouts of North East Ohio	PRIVATE	TRIBUTARY TO BOSTON RUN	RECREATION, PRIVATE	EARTHFILL
HAUSFIELD POND DAM	EXEMPT	IV	Kenneth Hausfield	PRIVATE	TRIBUTARY TO CUYAHOGA RIVER	RECREATION, PRIVATE	EARTHFILL
PESEK LAKE DAM	EXEMPT	IV	Lori Pesek	PRIVATE	TRIBUTARY TO CUYAHOGA RIVER	RECREATION, PRIVATE	EARTHFILL, HOMOGENEOUS
MAYER POND DAM	EXEMPT	IV	Hilda M. Mayer	PRIVATE	TRIBUTARY TO CUYAHOGA RIVER		
FEDERAL PARK LAKE DAM	EXEMPT	IV	USDI, National Park Service	PUBLIC, FEDERAL	TRIBUTARY TO SLIPPER RUN	RECREATION, PUBLIC	EARTHFILL
UNKNOWN	EXEMPT	IV			TRIBUTARY TO LANGES RUN		
HORSESHOE POND DAM	EXEMPT	IV	USDI, National Park Service	PUBLIC, FEDERAL	TRIBUTARY TO CUYAHOGA RIVER	RECREATION, PUBLIC	EARTHFILL
FIVE ACRE LAKE	EXEMPT	IV	MARK CANDLE	PRIVATE	TRIBUTARY TO LANGES RUN		
STEINER POND DAM		IV	United States of America	PUBLIC, FEDERAL	TRIBUTARY TO CUYAHOGA RIVER	RECREATION, PUBLIC	EARTHFILL
CRAWFORD POND DAM		IV	George Crawford	PRIVATE	TRIBUTARY TO DICKERSON RUN	RECREATION, PRIVATE	
QUICK POND DAM	EXEMPT	IV	Tom Quick	PRIVATE	SALT RUN	RECREATION, PRIVATE	
FEDERAL PARK LAKE DAM	EXEMPT	IV	USDI, National Park Service	PUBLIC, FEDERAL	TRIBUTARY TO SLIPPER RUN	RECREATION, PUBLIC	EARTHFILL
SEWAGE DISPOSAL POND NO. 4		UNCLASS	City of Akron	PUBLIC, LOCAL		WASTE RETENTION	
SEWAGE DISPOSAL POND NO. 5		UNCLASS	City of Akron	PUBLIC, LOCAL		WASTE RETENTION	
SEWAGE DISPOSAL POND NO. 1		UNCLASS	City of Akron	PUBLIC, LOCAL		WASTE RETENTION	
SEWAGE DISPOSAL POND NO. 2		UNCLASS	City of Akron	PUBLIC, LOCAL		WASTE RETENTION	
SEWAGE DISPOSAL POND NO. 3		UNCLASS	City of Akron	PUBLIC, LOCAL		WASTE RETENTION	
UNNAMED LAKE DAM	EXEMPT	UNCLASS	United States of America	PUBLIC, FEDERAL	TRIBUTARY TO CUYAHOGA RIVER		

Appendix C

Sand Run Restoration Project BCA Report