

Section 1. Northeast Ohio Regional Sewer District Annex

The Community Profile summarizes the County’s history and existing environmental and socioeconomic conditions. Environmental and socioeconomic factors include geography, topography, climate, population, economic, land use and development trends.

1.1. Regional Makeup

The Northeast Ohio Regional Sewer District (NEORS D) protects public health and the environment by leading effective wastewater and stormwater management. As the largest wastewater treatment provider in the State of Ohio, the Sewer District spans 380 square miles, serves 62 communities across portions of four Counties and one million residents, and treats 90 billion gallons of wastewater a year.

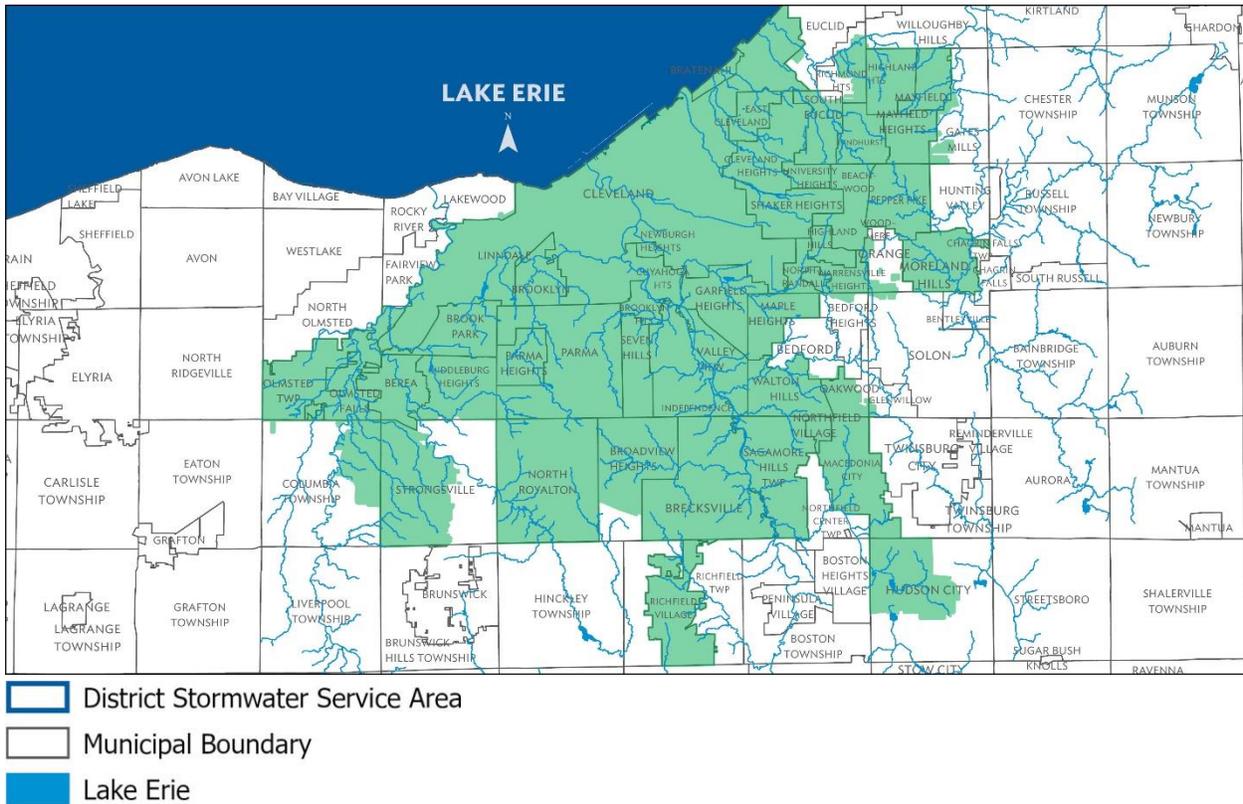
The Sewer District’s Project Clean Lake construction program will reduce annual Lake Erie pollution by 4 billion gallons by 2036, while its Regional Stormwater Management Program addresses widespread inter-community problems like flooding, pollution, and erosion. <https://www.neorsd.org/about/>

All or portions of 56 Cuyahoga County Communities are part of the District’s Regional Stormwater Management Program (RSMP) The goal of the RSMP is to solve intercommunity drainage issues through operations and maintenance, planning, design, and construction. The stormwater utility is funded by impervious surface fees which provides a consistent revenue stream to mitigate the effects of flooding and erosion along the regional stormwater system. <https://www.neorsd.org/stormwater-2/stormwater-management-program/>

As defined by Title V in the Code of Regulations of the Northeast Ohio Regional Sewer District, Stormwater Master Plans (SWMP) have been developed for the District’s Stormwater Service Area and constitute the District’s plans for protecting and managing the Regional Stormwater System (RSS) which generally is defined as streams, crossings, basins, or culverted streams with over 300 acres of drainage area. The intent of the SWMPs is to guide the Regional Stormwater Management Program’s activities in the Cuyahoga, Rocky River, Chagrin, and Lakes Erie Direct Tributaries watersheds, and to develop a stormwater construction and maintenance plan to reduce the impact of flooding, minimize erosion, and improve water quality.

Activities performed under the SWMPs include data collection and inventory of all the assets within and adjacent to the RSS, hydrologic and hydraulic modeling of the RSS using PCSWMM, project area identification in areas where the acceptable level of risk exceeds the District’s standards, and alternatives evaluation to address identified problem areas. The SWMP also informs the District’s operation and maintenance plan for the RSS.

FIGURE 1-1 MAP OF NEORSD STORMWATER SERVICE AREA



1.1.1 Land Use and Future Development Areas

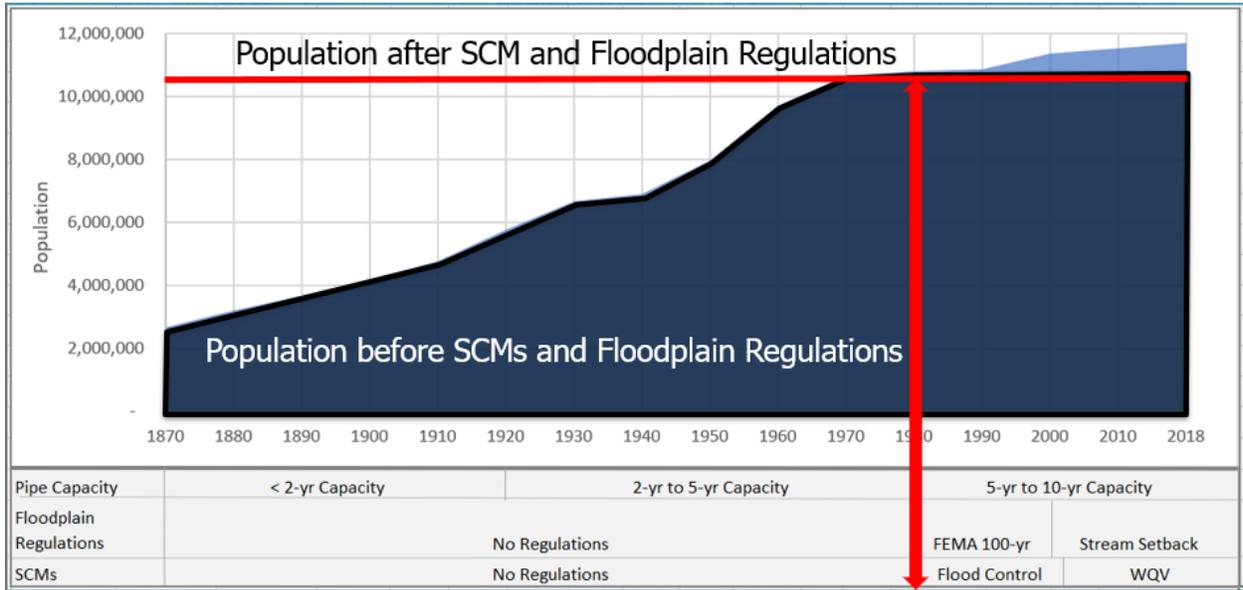
The majority of the NEORSD Stormwater Service Area in Cuyahoga County is developed. Past development patterns have impacted the regional drainage systems through hydraulic and hydrologic modifications which has led to flooding and erosion issues. While there is minimal area left to develop in Cuyahoga County those areas that are left typically are more sensitive to impacts from development like floodplains and wetlands. Stormwater management, riparian setback, and floodplain regulation enforcement will be key moving forward to protect the region from additional impacts from development.

Development of remaining green space can have an impact on the volume and timing of stormwater runoff which can lead to increases in flooding. Evolving regulations have attempted to address the impacts of new development since the mid-1980's, as climate change occurs these regulations will continue to need to evolve. As areas of the county re-develop, a focus will need to be placed on weaving stormwater management back into those areas that developed prior to any regulations in order to begin reversing the effects of previous development. Figure 1-2 shows the population growth of the region and the timing of stormwater regulation establishment.

Through The District's Code of Regulations Titles IV and V the District assists communities in Cuyahoga County with plan reviews for new development sites with a focus on stormwater management and sanitary connections.

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FIGURE 1-2 POPULATION GROWTH OF NEORS D AND STORMWATER REGULATIONS



Section 2. The Planning Process

The District was an active participant during the plan update process. This included participating in the Open Houses described in the Planning Process section of the base plan. Representatives also met individually with the project team to discuss the vulnerabilities of the District. Because the District spans a large portion of the county, rather than any one region, it was decided that the best path forward to identify and address the specific needs was to create an annex for the NEORS D that builds upon the base plan.

TABLE 1 - DISTRICT PLANNING PROCESS

Meeting	Representative	Title
Open House – 9/8/21	John Corn	Emergency Management & Business Continuity Program Manager
Open House – 9/8/21	David Ritter	Manager of Watershed Technical Support
Open House – 9/8/21	George Remias	Manager of Strategic Support
Open House – 9/8/21	Rachel Webb	Project Manager III
Open House – 9/8/21	Keith McClintock	Manager of Watershed Programs
Open House – 9/8/21	Grace Elmudesi	Health and Safety Paraprofessional
Individual Meeting - 9/21	David Ritter	Manager of Watershed Technical Support
Individual Meeting - 9/21	Grace Elmudesi	Health and Safety Paraprofessional

Section 3. Hazard Identification and Risk Assessment (HIRA)

The District assessed their vulnerability and decided that flooding was the primary concern. Other existing hazards, while not a major concern, do cause or otherwise exacerbate the flooding issues experienced by the NEORS D.

Flooding and its secondary hazards, including Dam Failure and Building/Structural Collapse, are profiled as a part of this annex. The Mitigation Strategy directly addresses the issues identified.

Hazard	NEORS D STORMWATER MANAGEMENT PROGRAM
Flooding	Flooding is the most prevalent issue for the Sewer District Regional Stormwater Management Program
Extreme Temperatures	The NEORS D determined that this hazard was not applicable.
Severe Winter Storms	The NEORS D determined that this hazard was not applicable.
Earthquakes	The NEORS D determined that this hazard was not applicable.
Drought	Concern due to impacts to aquatic health
Severe Thunderstorms	More frequent and severe storms due to climate change are a concern as they can lead to intense urban flooding
Tornadoes	Concern due to increased debris in streams, which impacts conveyance
Terrorism/CBNRE Incident	The NEORS D determined that this hazard was not applicable.
Building/Structural Collapse	Aging stormwater culvert infrastructure failure is a concern as stormwater conveyance can be impacted. Erosion along regional streams threatens building, utility, and transportation assets.
Utility Disruption	Erosion along regional streams threatens utilities.
Active Shooter Incident	The NEORS D determined that this hazard was not applicable.
IT/Communications Disruption	The NEORS D determined that this hazard was not applicable.
Transportation Incident	The NEORS D determined that this hazard was not applicable.
Hazardous Materials Incident	The NEORS D determined that this hazard was not applicable.
Dam Failure	There are 8 ODNR regulated dams within the NEORS D service area in Cuyahoga County, many non-regulated dams.
Civil Disturbance	The NEORS D determined that this hazard was not applicable.
Nuclear Power Incident	The NEORS D determined that this hazard was not applicable.

3.1. Flooding

3.1.1 History of Occurrences

In addition to the occurrences documented by the County in the main body, the District has put in place a media tracking database to capture flooding events that impact residents but may not reach the level of a disaster declaration. Many areas of Cuyahoga County are affected by urban flooding where intense rainfall overwhelms the existing infrastructure and results in short duration flooding. The media tracking database was developed to capture these short lived but impactful flooding episodes which can prove useful in verifying the results of the modeling effort.

The District has also developed a Report a Flood tool that communities can use to log calls from residents about flooding in their communities. The tool was premiered in 2020, the District is promoting its use among member communities.

3.1.2 Future Probability

Through the District’s Stormwater Master Plans Hydraulic and Hydrologic models were built of all of the sub-watersheds in the service area down to a catchment area of less than 150 acres and incorporate a high level of field collected survey data, the models have been calibrated and validated according to District SWMP standards.

Inundation depths were determined from the modeling effort for design storms ranging from the 1–year up to and including the 100-year event. The inundation depths are then compared to lidar data of the surrounding terrain to determine the impact to buildings and transportation assets. The table below presents the building and transportation assets impacted at the different recurrence intervals which translates into an annual probability of being flooded. The data presented in table below includes buildings where modeled flooding depths are greater than the estimated first-floor elevation and transportation assets that are inundated. The results shown include more than just the Cuyahoga County portion of the Stormwater Service Area.

TABLE 2 - FLOODING IMPACTS WITHIN THE DISTRICT STORMWATER SERVICE AREA.

Design Storm	Annual Exceedance Probability %	Buildings	Transportation Assets
1-yr.	100	24	252
2-yr.	50	56	452
5-yr.	20	169	814
10-yr	10	407	1,162
25-yr.	4	1,010	1,699
50-yr.	2	1,566	2,064
100-yr.	1	2,224	2,726

CRS SWMP stormwater models were limited to evaluating the 10, 25, 50, and 100-year design storms.

Building and Transportation counts are based upon planning level stormwater model-predicted flooding along a regional stormwater network that receives approximately 300-acres of drainage and includes assets located outside of Cuyahoga County

Design Storms are 24-hour SCS Type II storms and rainfall depths are based upon NOAA Atlas 14 recurrence intervals

3.1.3 Regional Impacts

The Districts Stormwater Master Planning effort has identified more than 1 billion dollars of potential projects to reach a 100-year level of service across the stormwater service area. While a 100-year LOS is the goal in many areas this will not be achievable due to physical or budgetary constraints.

3.1.4 Climate Change Considerations

Future Probability

The National Weather Service out of Cleveland is predicting that the annual precipitation in the region will increase, most notably in the spring and fall which increase the amount of runoff and channel erosion. The number and intensity of very heavy precipitation events are increasing. Heavy precipitation events that historically occurred once in 20 years are projected to occur as frequently as every 5 to 15 years by late this century.

Regional Impacts

As rainfall volumes and intensity increase we will expect to see an increase in flooding and erosion and a reduction in water quality. Changes in rainfall will continue to exacerbate the urban flooding issue where infrastructure was not designed to handle the new weather and runoff regime. New infrastructure will cost more as pipes and structures will need to increase in size to meet level of service needs.

3.1.5 Secondary Hazards

Dam Failure

Within the Stormwater Service Area in Cuyahoga County there are a number of ODNR regulated dam structures on the RSS. These facilities are inspected by the Ohio Department of Natural Resources (ODNR) Dam Safety program for deficiencies and maintenance concerns. Of the regulated dams NEORS D is the owner of only one, the Lakeview Cemetery Flood Control Dam. Investments have been made over the years to keep this facility in compliance with ODNR Dam Safety regulations.

Located along the lower reach of Euclid Creek the Army Corps of Engineers designed and constructed the Euclid Creek Flood Control Channel in the 1980's which is owned by the City of Cleveland. The District has worked closely with the city and the USACE to begin addressing needed maintenance items to the channel and levee system.

TABLE 3 - IDENTIFIED DAMS ON THE REGIONAL STORMWATER SYSTEM IN CUYAHOGA COUNTY

Subwatershed	Community	ODNR Classification	Class	ODNR Name
Big Creek	Parma	Unregulated	N/A	Healy Pond Dam
Big Creek	Parma	Regulated	Class I	Hollenbeck Lake Dam
Doan Brook	Shaker Heights	Regulated	Class I	Lower Shaker Lake Dam
Doan Brook	Shaker Heights	Regulated	Class I	Upper Shaker Lake Dam
Doan Brook	Shaker Heights	Regulated	Class II	City of Shaker Heights Dam
Doan Brook	Shaker Heights	Unregulated	N/A	Shaker Heights Country Club No. 1 Dam
Dugway East Branch	East Cleveland	Regulated	Class I	Forest Hill Park Dam No. 2

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Subwatershed	Community	ODNR Classification	Class	ODNR Name
Dugway West Branch	Cleveland Heights	Regulated	Class I	Lakeview Cemetery Flood Control Dam
Euclid Creek East	Richmond Heights	Unregulated	N/A	Mayfair Swim Club Lake Dam
Euclid Creek West	Lyndhurst	Regulated	Class III	Acacia Country Club Lake Dam
Mill Creek	Warrensville Heights	Regulated	Class I	Kerruish Stormwater Control Facility Dam
Pepper Luce Creek	Pepper Pike	Unregulated	N/A	Pepper Pike Irrigation Pond Dam
Pepper Luce Creek	Pepper Pike	Unregulated	N/A	Pepper Pike Country Club Lake No. 1 Dam
Pepper Luce Creek	Pepper Pike	Unregulated	N/A	Ursuline College Lake Dam
Small Trib to the RR East Branch	Broadview Heights	Unregulated	N/A	Briarwood Golf Course Lake No. 1 Dam
Big Creek West Branch	Cleveland	Unregulated	N/A	Puritas Basin

Building/Structural Collapse

As part of the Regional Stormwater program the District evaluated the effects of streambank erosion on buildings, transportation assets, and utilities adjacent to the regional stormwater system. The District has also inventoried and inspected culverted streams which drain more than 300 acres. The results of these effort have brought to light the need for investment in acquisition of vulnerable structures and the need for a repair and replacement program for culverted streams which in many cases lie under private property.

The District has identified over 15,000 feet of culverted streams in need of repair or replacement, the probability of failure is tied to the type of materials used in the original construction. Corrugated metal pipe is most prone to rapid failure once corrosion impacts the pipes structural integrity. As this infrastructure ages conditions will only worsen without intervention.

Based on planning level estimates more than 18 million dollars in funding is needed for the repair and/or replacement of the 20 worst culverted stream segments. Erosion protection and acquisition of un-sustainable development is wrapped into the 360 million dollars in project costs developed by the Stormwater Master Plans.

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TABLE 4 - CULVERTED STREAMS IN NEORS D TERRITORY

Asset	Community	Material	SWIM Score	Hazard Addressed	Rehab Level	Rehab Length (ft.)	Rehab Sq.ft.	Total Cost
WB00084	Cleveland	CMP	4	Structural	Replace	376	0	\$554,000.00
WB00173	Brookpark	RCP	5	Structural	Replace	615	0	\$4,625,000.00
HC00053	Independence	CMP	4	Structural	Replace	296	0	\$1,480,000.00
CH00175	Brecksville	CMP/RCP	5	Structural	Spot Repair/ Lining/ Replace	240	116	\$203,000.00
BK00520	Strongsville	CMP	4	Structural	Lining	155	40	\$53,800.00
BD00296	North Royalton	CMP	4	Structural	Lining/Replace ment	840	0	\$168,000.00
DE00015	Cleveland Heights	CMP/RCP	4	Structural	Lining	424	18615.2	\$1,479,482.62
PC00226	Pepper Pike	CMP/RCP	4	Structural	Lining	200	28140	\$2,200,540.68
EW00145	Beachwood	CMP	4	Structural	Lining	896.3	0	\$1,892,188.28
BC00037	Parma	CMP/RCP	4	Structural	Spot Repair/Lining	413	1358	\$509,195.00
DE00017	Cleveland Heights	RCP	4	Structural	Spot Repair/Lining	7612	1046	\$1,203,215.80
DW00091	Cleveland Heights	RCP	4	Structural	Replace/Clean	188.8	0	\$180,270.00
DW00029	Cleveland Heights	Masonry	4	Structural	Lining	204.1	0	\$199,669.08
MC00168	Beachwood	RCP	4	Structural	Spot Repair	24	201	\$42,006.00
CU00131	Valley View	RCP	4	Structural	Lining	248.4	0	\$776,448.00
CS00032	Sagamore Hills	CMP	4	Structural	Daylight	0	0	\$295,000.00
WB00167	Brookpark	Metal	5	Structural	Replace	140	0	\$133,500.00
RT00004	Cleveland	CMP	4	Structural	Spot Repair/Lining	759	1300	\$2,247,000.00
WC00035	Independence	CMP	4	Structural	Spot Repair/Lining	115	38	\$8,350.00
CC00157	Broadview Heights	CMP	4	Structural	Replace	475	0	TBD
TU00011	Walton Hills	CMP	4	Structural	Spot Repair/Replace	250	20	\$76,060.00

Section 4. Mitigation Strategy

The intent of the Mitigation Strategy is to provide Cuyahoga County and its municipalities with the goals that will serve as the guiding principles for future mitigation policy and project administration, along with a list of proposed actions deemed necessary to meet those goals and reduce the impact of natural, technological, and man-made hazards. It is designed to be comprehensive and strategic in nature.

The development of the strategy included a thorough review of natural, technological, and man-made hazards and identified policies and projects intended to not only reduce the future impacts of hazards, but also to help the County achieve compatible economic, environmental and social goals. The development of this section is also intended to be strategic, in that all policies and projects are linked to establish priorities assigned to specific departments or individuals responsible for their implementation and assigned target completion deadlines. Funding sources are identified that can be used to assist in project implementation.

- **Mitigation goals** are general guidelines that explain what the County wants to achieve. Goals are usually expressed as broad policy statements representing desired long-term results.
- **Mitigation objectives** describe strategies or implementation steps to attain the identified goals. Objectives are more specific statements than goals; the described steps are usually measurable and can have a defined completion date.
- **Mitigation Actions** provide more detailed descriptions of specific work tasks to help the County and its municipalities achieve prescribed goals and objectives.

4.1. Regional Capability Assessment

The mitigation strategy includes an assessment of the capabilities to augment known issues and weaknesses from identified natural, technological, and man-made hazards.

4.1.1 Ability to Expand on Existing Capabilities

The planning process used surveys to determine the existing capabilities of the County and its political subdivisions. These capabilities can be expanded upon with the proper influx of funds or personnel. Should additional state or federal funding become available to specifically augment existing capabilities, then the jurisdictions represented in this plan would be able to improve their capabilities. Additionally, as personnel turn over, they may be replaced with individuals with skillsets not captured in these surveys. The County will continue to develop their capabilities over time and expand upon them where they are able.

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Planning and Regulatory Capability: The list below summarizes each community's planning and regulatory capabilities. These are the plans and policies that jurisdictions have in place that can help to further mitigation.

- Stormwater Master Plan
- Emergency Operations Plan
- Continuity of Operations Plan
- Urgent Storm Response
- Stormwater Construction Plan
- Property Acquisition Program
- H&H Modeling

Administrative and Technical Capability: The list below provides a summary of administrative and technical capabilities organized by staff type and department. It is important to understand current administrative and technical capabilities before developing a myriad of mitigation activities.

- Planners (with land use / development knowledge)
- Engineers
- Emergency Manager
- Inspectors
- Scientists
- GIS Personnel
- Grant Writers
- Regulatory

Fiscal Capability: This section identifies the financial tools or resources that Cuyahoga County could potentially use to help fund mitigation activities. Fiscal capabilities include community specific as well as state and federal resources.

- Capital Improvement Planning
- Water / Sewer fees
- Stormwater utility fees
- Partnering / Intergovernmental arrangements
- Other / Grants

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Self-Assessment of Capability: The table below is each community’s estimated degree of capability.

TABLE 4-1 OVERALL DEGREE OF CAPABILITY

Area	Limited	Moderate	High
Planning and Regulatory Capability			X
Administrative and Technical Capability			X
Fiscal Capability		X	
Community Political Capability	X		
Community Resiliency Capability		X	

4.2. Mitigation Actions

4.2.1 2017 Mitigation Action Review

After the first planning meeting, each participating jurisdiction reviewed mitigation actions from the 2017 HMP and determined each action to be; deferred into the new plan, changed to reflect an update in priorities, in progress, completed, or deleted. These actions can be found in Table 4-2. Actions marked as “Completed” were finished between the drafting of the 2017 HMP, and the 2021 HMP. Deletion of an action generally refers to that action no longer being a priority to the community; any other reasoning for the action being deleted is identified in the table.

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TABLE 4-2 PREVIOUS MITIGATION ACTION STATUS

Location	Hazard(s) Addressed	Action	Resp. Party	2022 Status (Keep in plan update, Ongoing project, Complete, Remove from plan)
All NFIP Jurisdictions*	Flooding	Develop partnerships to enhance stormwater regulations countywide.	Cuyahoga County, NEORSD, Individual NFIP Jurisdictions	Ongoing
All NFIP Jurisdictions*	Flooding / Erosion	Create model ordinances addressing streambank erosion to establish increased continuity among communities.	Cuyahoga County, NEORSD, Individual NFIP Jurisdictions	Ongoing
All NFIP Jurisdictions*	Flooding	Map areas that flood that are outside of the SFHA.	Cuyahoga County, NEORSD, Individual NFIP Jurisdictions	NEORSD Stormwater Master Plans are complete for all NEORSD Stormwater Service Area communities, Hydraulic and Hydrologic models of storms up to 100-year recurrence interval complete for all Regional Stormwater Systems assets – updated as needed
All NFIP Jurisdictions*	Flooding	Coordinate higher floodplain regulation standards across all NFIP communities in the County	Cuyahoga County, NEORSD, Individual NFIP Jurisdictions	Ongoing
North Royalton	Flooding	Implement an ordinance that will allow the NEORSD to collect fees where 25% will go to future local flood mitigation projects, and 75% will go to regional projects.	City of North Royalton, NEORSD	Complete

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4.2.2 Mitigation Action Development

Mitigation actions are the culmination of the entire mitigation plan. These actions are based on the vulnerabilities of each community, as identified in the Risk Assessment.

There are four identified priorities for this annex’s mitigation actions:

1. **On Construction Plan:** Actions that are actively planned for construction.
2. **Advanced Planning:** Actions that appear in planning documents, have received full quotes, and are expected to go into effect.
3. **Scored:** These actions have been proposed and have been vetted into initial planning documents.
4. **Unscored:** These actions have been proposed but have not advanced further into the planning process.

Priorities are subject to change and modification over time.

Resp. Party	Location	#	Hazard(s) Addressed	Priority	Action	Cost	Time Frame	Fund. Src.	Rep.
NEORS D	Parma	1	Flooding	1 - On Construction Plan	Baldwin Creek SWMP Project Area 6 - Flood and Erosion Reduction near York and Pleasant Valley Roads (BDPA06).xml	\$13,904,369	2022-2027	Stormwater Fee	Director of Watershed Programs
NEORS D	North Royalton	3	Flooding	1 - On Construction Plan	Big Creek at Sprague_ Thornhurst and Maplegrove in Parma and North Royalton (BC-NR-02).xml	\$8,842,000	2022-2027	Stormwater Fee	Director of Watershed Programs
NEORS D	Shaker Heights	4	Flooding / Dam Failure	1 - On Construction Plan	Upper and Lower Shaker Lakes DBSH04	\$28,300,000	2022-2027	Stormwater Fee	Director of Watershed Programs

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Resp. Party	Location	#	Hazard(s) Addressed	Priority	Action	Cost	Time Frame	Fund. Src.	Rep.
NEORS D	Mayfield	5	Flooding	1 - On Construction Plan	Worton Park Drive Neighborhood BEMA01	\$2,275,000	2022-2027	Stormwater Fee	Director of Watershed Programs
NEORS D	Middleburg Heights	6	Flooding	1- On Construction Plan	Abram Creek SWMP Project Area 1 - Flood Reduction along Big Creek Parkway in Middleburg Heights (ACPA01)	\$25,277,000	2022-2027	Stormwater Fee	Director of Watershed Programs, City of Middleburg Heights
NEORS D	Parma	7	Flooding	1- On Construction Plan	West Creek SWMP Project area 4 - Veterans Basin in Parma (WCPA04).xml	\$12,302,000	2022-2027	Stormwater Fee	Director of Watershed Programs
NEORS D	North Randall	8	Flooding	1- On Construction Plan	Tinkers Crk SWMP Proj Area 9 - Bear Creek Floodplain _ Stream Restoration in N Randall _ Warrensville Hts (TCPA09).xml	\$26,441,000	2022-2027	Stormwater Fee	Director of Watershed Programs
NEORS D	Parma	9	Flooding	1- On Construction Plan	Big Creek SWMP Project area 7 - Ridgewood Basins in Parma (BCPA07).xml	\$35,555,000	2022-2027	Stormwater Fee	Director of Watershed Programs
NEORS D	Parma	10	Flooding	1- On Construction Plan	Baldwin Creek SWMP Project area 7 - Flood Reduction Downstream from the Stormes Drive Basin (BDPA07).xml	\$5,419,700	2022	Stormwater Fee	Director of Watershed Programs
NEORS D	Cleveland	11	Flooding	2 - Advanced Planning	West Branch of Big Creek Flooding between McGowan Ave and Longmead (WB-CL-10).xml	\$2,722,000.00	2022-2027	Stormwater Fee	Director of Watershed Programs

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Resp. Party	Location	#	Hazard(s) Addressed	Priority	Action	Cost	Time Frame	Fund. Src.	Rep.
NEORSD	Cleveland	12	Flooding	2 - Advanced Planning	West Branch of Big Creek between Bennington and Carrington Ave (WB-CL-08).xml	\$1,712,000.00	2022-2027	Stormwater Fee	Director of Watershed Programs
NEORSD	Cleveland	13	Flooding	2 - Advanced Planning	West Branch of Big Creek between Carrington and Kirton (WB-CL-09)	\$1,338,000.00	2022-2027	Stormwater Fee	Director of Watershed Programs
NEORSD	Cleveland	14	Flooding	2 - Advanced Planning	Mill Creek SWMP Problem Area 8-Conveyance Improvements along Lee Road (MCCL08).xml	\$41,673,000	2022-2027	Stormwater Fee	Director of Watershed Programs
NEORSD	Walton Hills	15	Flooding	2 - Advanced Planning	Tinkers Creek SWMP Project Area 2 Stream Stabilization and Floodplain Expansion in Walton Hills and Oakwood Village (TCPA02).xml	\$2,179,000	2022-2027	Stormwater Fee	Director of Watershed Programs
NEORSD	Columbia Township	16	Flooding	2 - Advanced Planning	Rocky River West Branch SWMP - Problem Area 11 (WBPA11).xml	\$4,494,000	2022-2027	Stormwater Fee	Director of Watershed Programs
NEORSD	Parma Heights	17	Flooding	2 - Advanced Planning	Big Creek at Pearl_ Meadowbrook and W 130th (BC-PH-05).xml	\$14,500,000	2022	Stormwater Fee	Director of Watershed Programs
NEORSD	Garfield Heights	18	Flooding	2 - Advanced Planning	Mill Creek along Broadway Ave in Garfield Heights (MCGH13).xml	TBD	2022	Stormwater Fee	Director of Watershed Programs

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Resp. Party	Location	#	Hazard(s) Addressed	Priority	Action	Cost	Time Frame	Fund. Src.	Rep.
NEORSD	Parma	19	Flooding	2 - Advanced Planning	Stickney Creek SWMP Problem Area 1- Property Acquisition Plan South of I-480 (STPA01).xml	\$24,665,000	2022-2027	Stormwater Fee	Director of Watershed Programs
NEORSD	Brooke Park, Middleburg Heights	20	Flooding, Structural Collapse	2 - Advanced Planning	Abram Creek flood reduction on Smith Rd. culverted stream rehabilitation	\$7,019,000	2022-2027	Stormwater Fee	NEORSD
NEORSD	Cleveland	21	Flooding	2 - Advanced Planning	West Branch of Big Creek_ Puritas Basin (WB-CL-05).xml	TBD	2022	Stormwater Fee	Director of Watershed Programs
NEORSD	Cleveland	22	Flooding, Erosion	2 - Advanced Planning	Big Creek Main Branch flood reduction from confluence with Cuyahoga River to Ridge Rd. Floodplain creation, acquisition, conveyance improvements, and structural repairs	\$121,000,000	2022-2027	Stormwater Fee	NEORSD
NEORSD	Cleveland	23	Flooding	2 - Advanced Planning	BC SWMP Problem Area 10- Storage and Conveyance Improvements near I-71 and Cleveland Metroparks Zoo (BCCL10).xml	\$121,020,400	2022-2027	Stormwater Fee	Director of Watershed Programs
NEORSD	Cleveland	24	Flooding	2 - Advanced Planning	BCWB Problem Area 7- Stream Relocation_ Stream Restoration_ and Basin Improvements (WBCL07).xml	\$13,383,000	2022-2027	Stormwater Fee	Director of Watershed Programs
NEORSD	Broadview Heights	25	Flooding	2 - Advanced Planning	Chippewa Creek SWMP Project Area 10 - Stream Stabilization and Restoration Upstream and Downstream from Wallings Rd (CCPA10).xml	\$20,193,000	2022	Stormwater Fee	Director of Watershed Programs

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Resp. Party	Location	#	Hazard(s) Addressed	Priority	Action	Cost	Time Frame	Fund. Src.	Rep.
NEORS D	Brook Park	26	Flooding	3 - Scored	BCWB Problem Area 2- Stream Restoration and Storage near Smith Road (WBBP02).xml	\$13,487,000	2022-2027	Stormwater Fee	Director of Watershed Programs
NEORS D	Olmsted Township	27	Flooding	3 - Scored	Rocky River West Branch SWMP - Problem Area 04 (WBPA04).xml	\$2,191,000	2022-2027	Stormwater Fee	Director of Watershed Programs
NEORS D	Brooklyn	28	Flooding	3 - Scored	Big Creek SWMP Problem Area 8- Big Creek Floodproofing near Brookpark Road in Brooklyn (BCBR08).xml	\$730,600	2022	Stormwater Fee	Director of Watershed Programs
NEORS D	Brook Park	29	Flooding	3 - Scored	BCWB SWMP Problem Area 4- Culverted Stream Daylighting and Storage near Holy Cross Cemetry (WBBP04).xml	\$6,366,500	2022	Stormwater Fee	Director of Watershed Programs
NEORS D	North Royalton	30	Flooding	3 - Scored	Baldwin Creek SWMP Problem Area 9 (BDPA09).xml	\$3,628,000	2022	Stormwater Fee	Director of Watershed Programs
NEORS D	Cleveland	31	Flooding	3 - Scored	Rocky River Main Stem SWMP - Problem Area 02 (RMPA02).xml	\$756,000	2022	Stormwater Fee	Director of Watershed Programs
NEORS D	Brook Park	32	Flooding	3 - Scored	Abram Creek SWMP Problem Area 6 (ACPA06).xml	\$7,019,000	2022	Stormwater Fee	Director of Watershed Programs

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Resp. Party	Location	#	Hazard(s) Addressed	Priority	Action	Cost	Time Frame	Fund. Src.	Rep.
NEORS D	Parma	33	Flooding	3 - Scored	West Creek SWMP Problem Area 5- Conveyance Improv._Bank Stabilization near Broadview Rd. (WCPA05).xml	\$2,410,000	2022	Stormwater Fee	Director of Watershed Programs
NEORS D	Middleburg Heights	34	Flooding	3 - Scored	Abram Creek SWMP Problem Area 3 (ACPA03).xml	\$2,553,000	2022	Stormwater Fee	Director of Watershed Programs
NEORS D	Brook Park	35	Flooding	3 - Scored	BCWB SWMP Problem Area 1- Culvert Daylighting_Storage south of Snow Road (WBBP01).xml	\$4,036,000	2022	Stormwater Fee	Director of Watershed Programs
NEORS D	Olmsted Township	36	Flooding	3 - Scored	Rocky River West Branch SWMP - Problem Area 05 (WBPA05).xml	\$7,306,000	2022	Stormwater Fee	Director of Watershed Programs
NEORS D	Beachwood	37	Flooding	3 - Scored	Mill Creek SWMP Problem Area 1- Stream Realignment at the Caterbury Golf Club (MCBW01).xml	\$1,254,000	2022	Stormwater Fee	Director of Watershed Programs
NEORS D	Walton Hills	38	Flooding	3 - Scored	Tinkers Creek SWMP Project Area 14 Channel Realignment and Restoration along Tinkers Creek Road in Walton Hills (TCPA14).xml	\$2,889,000	2022	Stormwater Fee	Director of Watershed Programs
NEORS D	Brooklyn	39	Flooding	3 - Scored	Big Creek Problem Area 9 (BCBR09).xml	\$354,000,000	2022	Stormwater Fee	Director of Watershed Programs

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NEORS D	Strongsville	40	Flooding	3 - Scored	Rocky River East Branch SWMP Standalone RY00361.xml	\$2,140,000	2022	Stormwater Fee	Director of Watershed Programs
NEORS D	North Royalton	41	Flooding	3 - Scored	Baldwin Creek SWMP Project Area 10 - Flood Reduction and Abbey Road Basin Improvements in North Royalton (BDPA10).xml	\$4,477,000	2022	Stormwater Fee	Director of Watershed Programs
NEORS D	Warrensville Heights	42	Flooding	3 - Scored	Tinkers Creek SWMP Project Area 7 - Bear Creek Bank Stabilization along I-480 in Warrensville Heights (TCPA07).xml	\$1,844,000	2022	Stormwater Fee	Director of Watershed Programs
NEORS D	Berea	43	Flooding	3 - Scored	Rocky River East Branch SWMP Problem Area 1 (EBPA01).xml	\$25,549,000	2022	Stormwater Fee	Director of Watershed Programs
NEORS D	Brooklyn	44	Flooding	3 - Scored	Stickney Creek Stream Restoration and Property Acquisition Upstream of Biddulph Road in Brooklyn (STBR03a).xml	\$38,270,000	2022	Stormwater Fee	Director of Watershed Programs
NEORS D	Cleveland	45	Flooding	3 - Scored	Stickney Creek SWMP Problem Area 2- Property Acquisition Plan Upstream and Downstream of Pearl Rd (STCLO2).xml	\$49,774,000	2022	Stormwater Fee	Director of Watershed Programs
NEORS D	Brook Park	46	Flooding	3 - Scored	Big Creek West Branch SWMP Project Aea 3 - Culvert Replacement and Restoration Brook Park (WB-BP-03).xml	\$12,521,200	2022	Stormwater Fee	Director of Watershed Programs

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Resp. Party	Location	#	Hazard(s) Addressed	Priority	Action	Cost	Time Frame	Fund. Src.	Rep.
NEORS D	Brecksville	47	Flooding	3 - Scored	Chippewa Creek SWMP Project Area 1 - Flooding and Erosion Reduction West of Downtown Brecksville (CCPA01).xml	\$1,407,000	2022-2027	Stormwater Fee	Director of Watershed Programs
NEORS D	Brecksville	48	Flooding	3 - Scored	Cuyahoga Mainstem SWMP Project Area 2 - Stabilization and Flood Reduction along Vaughn Road in Brecksville (MSPA02).xml	\$5,244,000	2022-2027	Stormwater Fee	Director of Watershed Programs
NEORS D	Independence	49	Flooding	3 - Scored	West Creek SWMP Project Area 13 - Conveyance Improvements and Bank Stabilization near Schaaf Road in Independence.xml	\$1,839,000	2022	Stormwater Fee	Director of Watershed Programs
NEORS D	Broadview Heights	50	Flooding	3 - Scored	Chippewa Creek SWMP Project Area 8 - Stream Daylighting and Flood Reduction North of Royalwood Rd (CCPA08).xml	\$13,555,000	2022	Stormwater Fee	Director of Watershed Programs
NEORS D	Cleveland	51	Flooding	4 - Un-scored	Univesity Circle & Cultural Gardens DBCLO6	\$5,985,000	2022	Stormwater Fee	Director of Watershed Programs
NEORS D	Cleveland	52	Flooding	4 - Un-scored	Euclid Creek Flood Control Channel ECCL02	\$13,353,000	2022	Stormwater Fee	Director of Watershed Programs
NEORS D	Cleveland	53	Flooding	4 - Un-scored	Cedar Glen Neighborhood DBCH05	\$2,588,000	2022	Stormwater Fee	Director of Watershed Programs

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Resp. Party	Location	#	Hazard(s) Addressed	Priority	Action	Cost	Time Frame	Fund. Src.	Rep.
NEORS D	Richmond Heights	54	Flooding	4 - Un-scored	Euclid East Branch EERH07	\$947,000	2022	Stormwater Fee	Director of Watershed Programs
NEORS D	Mayfield Heights, Lyndhurst, South Euclid	55	Flooding	4 - Un-scored	Euclid West Branch Multiple Residential EWLY06	\$8,244,000	2022	Stormwater Fee	Director of Watershed Programs
NEORS D	Cleveland	56	Flooding	4 - Un-scored	Dugway Brook East Branch Culvert DUCLO1	\$63,312,000	2022	Stormwater Fee	Director of Watershed Programs
NEORS D	Cleveland	57	Flooding	4 - Un-scored	Dugway Brook Forest Hills Dam DEEC03	\$22,906,000	2022	Stormwater Fee	Director of Watershed Programs
NEORS D	Shaker Heights	58	Flooding, Dam Failure	4 - Un-scored	DBSH04 Upper and Lower Shaker Lakes	\$29,219,000	2022-2027	Stormwater Fee, FEMA Grant	Director of Watershed Programs

Section 5. Plan Implementation and Maintenance

5.1. Evaluation, Monitoring and Updating

Monitoring, evaluating, and updating this plan is critical to maintaining its value and success in regards to identified mitigation efforts. Ensuring effective implementation of mitigation activities paves the way for continued momentum in the planning process and gives direction for the future. This section explains who will be responsible for maintenance activities and what those responsibilities entail. It also provides a methodology and schedule of maintenance activities including a description of how the public will be involved on a continued basis.

Cuyahoga County HMPC established for this 2021 Plan is designated to lead plan maintenance processes of monitoring, evaluation and updating with support and representation from all participating municipalities. The Hazard Mitigation Planning Committee will coordinate maintenance efforts, but the input needed for effective periodic evaluations will come from County-wide representatives and other important stakeholders.

The HMPC will oversee the progress made on the implementation of action items identified and modify actions, as needed, to reflect changing conditions. The HMPC will meet annually to evaluate the plan and discuss specific coordination efforts that may be needed.

The annual evaluation of the 2021 Plan will not only include an investigation of whether mitigation actions were completed, but also an assessment of how effective those actions were in mitigating losses. A review of the qualitative and quantitative benefits (or avoided losses) of mitigation activities will support this assessment. Results of the evaluation will then be compared to the goals and objectives established in the plan and decisions will be made regarding whether actions should be discontinued or modified in any way in light of new developments in the community. Progress will be documented by the Mitigation Planning Committee for use in the next Hazard Mitigation Plan update. Finally, the Mitigation Planning Committee will monitor and incorporate elements of this Plan into other planning mechanisms.

This Plan will be updated by the FEMA approved five-year anniversary date, as required by the Disaster Mitigation Act of 2000, or following a disaster event. Future plan updates will account for any new hazard vulnerabilities, special circumstances, or new information that becomes available. During the five-year review process, the following questions will be considered as criteria for assessing the effectiveness of the HMP.

- Has the nature or magnitude of hazards affecting the County changed?
- Are there new hazards that have the potential to impact the County?
- Do the identified goals and actions address current and expected conditions?
- Have mitigation actions been implemented or completed?
- Has the implementation of identified mitigation actions resulted in expected outcomes?
- Are current resources adequate to implement the plan?
- Should additional resources be committed to address identified hazards?

Issues that arise during monitoring and evaluation which require changes to the local hazard, risk and vulnerability summary, mitigation strategy, and other components of the plan will be incorporated during future updates.

Update process for plan prior to 5-year update: any interested party wishing for an update of this Plan sooner than the 5-year update will submit such a request to the HMPC for consideration. The request shall be accompanied by a detailed rationale. The request will be evaluated, and a determination will be made as to whether the update request should be acted upon. If the decision is in the affirmative, an assignment will be made for an individual to author the update. The draft updated section along with a detailed rationale will be submitted to the Mitigation Planning Committee. The committee will circulate the draft updated section of the plan for comment and after an appropriate period of time, the committee shall make a decision to update the plan at least partially based on the feedback received.

5.2. Plan Update and Maintenance

This section describes the schedule and process for monitoring, evaluating, and updating the 2021 HMP.

5.2.1 Schedule

Monitoring the progress of the mitigation actions will be on-going throughout the five-year period between the adoption of the HMP and the next update effort. The HMPC will meet on an annual basis to monitor the status of the implementation of mitigation actions and develop updates as necessary.

The HMP will be updated every five years, as required by DMA 2000. The update process will begin at least one year prior to the expiration of the HMP. However, should a significant disaster occur, the HMPC will reconvene within 30 days of the disaster to review and update the HMP as appropriate.

5.2.2 Process

The HMPC will coordinate with responsible agencies/organizations identified for each mitigation action. These responsible agencies/organizations will monitor and evaluate the progress made on the implementation of mitigation actions and report to the HMPC on an annual basis. Working with the HMPC, these responsible agencies/organizations will be asked to assess the effectiveness of the mitigation actions and modify the mitigation actions as appropriate.

Future updates to the HMP will account for any new hazard vulnerabilities, special circumstances, or new information that becomes available. Issues that arise during monitoring and evaluating the HMP, which require changes to the risk assessment, mitigation strategy and other components of the HMP, will be incorporated into the next update of the HMP. The questions identified above would remain valid during the preparation of the update.

Integration into Existing Planning Mechanisms

An important implementation mechanism is to incorporate the recommendation and underlying principles of the HMP into planning and development such as capital improvement budgeting, general plans and comprehensive plans. Mitigation is most successful when it is incorporated within the day-to-day functions and priorities of the entity attempting to implement risk reducing actions. The integration of a variety of departments on the HMPC provides an opportunity for constant and pervasive efforts to network, identify, and highlight mitigation activities and opportunities. This collaborative effort is also important to monitor funding opportunities which can be leveraged to implement the mitigation actions.

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Past Integration

The Regional Stormwater Management Program began collecting fees and implementing projects in 2013, due to a pending lawsuit the program was put on hold until 2016 following an Ohio Supreme Court ruling finding in favor of the continuing the program. The last plan developed in 2016-2017 was being developed simultaneously with the beginning of the stormwater program. At that time the District identified broad programmatic areas that they would be involved with related to planning, design, construction, and operations and maintenance of stormwater projects. Many of the initial activities identified in the 2017 plan will continue to be on-going under the new plan.

Future Integration

As part of this 2022 plan the District identified flooding structural improvement project priorities across Cuyahoga County that will take many years to implement. As projects are constructed they can come off the project list and will be replaced by other priorities for the future planning periods. In addition to projects the District will continue to work with member communities on ways to mitigate risk and will update the plan accordingly. The District will seek additional funding opportunities through FEMA and others to help reduce risk and increase resiliency.