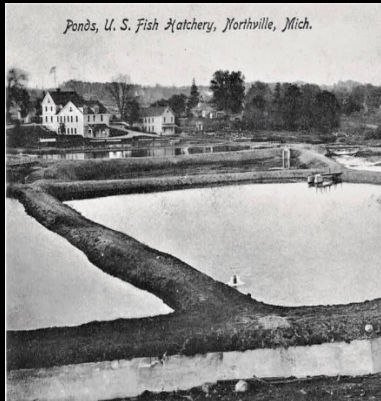




Our journey to restore our waterways and create a Riverwalk experience



Letter from Mayor Brian Turnbull

These are exciting times, and the trajectory that we embark on today in the Northville community of southeastern Michigan will determine our “Way Forward” for the next generation.

Our community is an actual headwaters, with three rivers converging into the Rouge River system. We truly can become a “connected city” with the implementation of a high-quality system of trails to be known as the Riverwalk.

The following Framework Plan encapsulates this vision. This current opportunity represents decades and even centuries of evolution of Northville’s rich history, which has been driven by our connection to the river and its waterways. In the Detroit area, everything is down-river from Northville. In Wayne County, our City is the highest point and has the only natural lake. Notably, this initiative can be the conduit to unite the Michigan trail systems and create an interface with city, county, and state parks. All in southeastern Michigan will be able to connect and experience the area’s rich history, beauty and topography.

Our history is firmly tied to the River. Dating back to the early 1800’s, Northville began as the original milling area of the Territory, with innovative hydraulic power. With the dawn of the Industrial Revolution, the City grew rapidly, ranking just behind Detroit in production of goods into the early 1900’s. My family roots in Northville extend back to this time – my grandfather assisted Henry Ford in the electrification of the Albert Kahn-designed water wheel valve plant, which supported an entire settlement of village industries operating on the waterways. We will again experience the river the way Henry Ford did on his honeymoon here, strolling the banks, taking in its natural beauty.

*The City has dreamed of a connected riverwalk system for many years, and now is the time. With cooperation from committed and enthusiastic partners, we can work collectively for the betterment of all in southeastern Michigan. I hope after you read this Framework Plan, you’ll be as excited as I am regarding the future and all that it can be. Let’s move forward ... **Together!***

Brian Turnbull

Letter from Nancy Darga, Chairman of River Restoration and Riverwalk Task Force.

Dear Citizens of Northville and Wayne and Oakland County,

Northville is at the crossroads of great opportunity and dire need. With new, redevelopment changes in our sights, Northville has the opportunity to improve the ecosystem by daylighting a section of the Rouge River enclosed decades ago, reducing downstream flooding, and providing connections to regional trail systems. How we integrate environmental improvements and recreational access will reshape the future of our community.

That is why many community volunteers and agencies have come together to form the Northville River Restoration Task Force. We proudly submit The Northville Riverwalk and River Restoration Framework Plan — a road map to improve the ecological health of the Rouge River and its tributaries within the city. It impacts most of Wayne County and calls to expand community access and recreation through a network of parks and trails called The Riverwalk.

The Plan is a transformational vision for Northville and its regional neighbors. It outlines steps to establish building standards and review processes to augment the overall health of the waterways. The plan’s Implementation Strategy identifies specific tasks with funding needs to support the long-term build-out of The Riverwalk and associated development projects.

My thanks to all who participated in the creation of this strategic framework.

Respectfully,

Nancy Darga

ACKNOWLEDGEMENTS

We would like to express appreciation to our mayor, Brian Turnbull, who sponsored this project with great energy and enthusiasm. His genuine inspiration and support is appreciated by the Task Force and the residents of our community.

Special thanks to the Northville River Restoration and Riverwalk Task Force members who dedicated countless volunteer hours researching, planning and conducting the studies needed to prepare this Framework Plan.

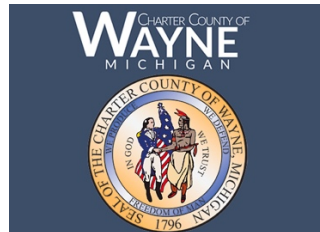
Thank you to Northville's City Council who helped to establish the Task Force and who continue to support its mission, goals and objectives.

This Framework Plan is a collaborative effort among many local and regional organizations who are shown below. We would like to acknowledge their efforts to support the Plan's vision.

Our partners with the Alliance of Rouge Communities and Friends of the Rouge have provided excellent support in a variety of ways, such as data collection, grant writing and strategic planning. We are grateful for their assistance and continue to look forward to working with them.

We would also like to thank the private property owners who are partnering with us to daylight the river and complete the Riverwalk. They include Hunter Pasteur Homes, Foundry Flask and Water Wheel Centre.

Lastly, we would like to thank all the residents of Northville, who have expressed their support for this extraordinary effort.



EXECUTIVE SUMMARY

The City of Northville, Michigan in its earliest days was a lumber and manufacturing powerhouse due to its ability to harness the waterpower of its rivers. Over time, industrial usage took its toll on the waterways. Now, with this Framework Plan, Northville is poised to reverse these negative impacts and restore its rivers and riverbanks to natural function. Due to proposed rare, large-scale commercial redevelopment projects, The City has an opportunity to daylight and restore its rivers. The river corridors will also be transformed with “The Riverwalk” to create linked parkways.

Northville occupies a strategic location in the headwaters of the Middle Rouge River Watershed. Whatever occurs upstream affects flows, water quality and habitat downstream. Thus, this community has great power to impact nearby cities in the watershed and provide recreational amenities for all to enjoy.

This Framework Plan outlines Key Projects that will boost the ecological health of this Michigan community and Wayne County, improving quality of life. The strategies in this plan will protect many cities from continued flooding, contamination, sediment loading, and the continued loss of natural assets. These cities include the City of Northville, Northville Township, Plymouth Township, Plymouth, Livonia, Westland, Dearborn Heights, Dearborn, Redford, and Southwest Detroit.

General cost estimates for these projects will be in the “Implementation Plan”. Without these proposed actions, the costs of declining stormwater infrastructure, continued flashy flows, riparian degradation, and loss of development potential will far outweigh the investments.

While many may equate “historic” for “quaint” which may describe a certain frozen-in-time sleepiness in a community, Northville is anything but. This town is aggressively moving forward with an ecosystem-centric development plan which it intends to be executed simultaneously with redevelopment projects of some sites that have languished for decades. These projects address the largest existing barriers to being an ideal aquatic influencer for the region.

The Key Projects address these categories of benefits:

- Aquatic Wildlife Diversity and Protection
- Reduced Local and Regional Flooding
- Streambank Restoration and Protection
- Contamination Remediation
- Regional Walking and Biking Trails
- Social Equity
- Green Infrastructure
- Economic Revitalization and Placemaking

Key Developments – Three (3) scheduled redevelopments, a rare magnitude of these once-in-a-lifetime projects, will kick-start Northville’s river infrastructure and overall development into the future:

- *Daylighting of approximately 1100 feet of the Rouge River system as part of the Northville Downs development plan is one key component of a stormwater management plan that will completely eliminate the current 100 year storm floodplain and detain over 30 million gallons of storm water that would otherwise continue to discharge contamination and sediment into the Rouge River. The project will feature a new 9-acre River Park.*
- *Natural restoration will create a naturally free-flowing channel with exposed bottomlands that will improve water quality, increase hydraulic capacity for downstream flood control, improve habitat, slow water velocity to reduce erosion, and promote community and ecological revitalization.*
- *The Foundry Flask redevelopment project will transform a brownfield site adjacent to the river, vacant for more than 40 years, into a mixed-use development with a riverwalk.*

These projects represent a unique and timely opportunity for public/private partnerships and investment. As of the date of this plan, Site Plans have already been submitted to the City of Northville for review. Pending approval, they will soon be “shovel ready” to commence. Acting now is paramount to seizing these once-in-a-lifetime opportunities.

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A. Introduction

Northville's historic mills powered a stunning era and regional role in the lumber and manufacturing industry. This town's abundant natural gift of water at our doorstep is both its legacy and its future.

But after two centuries of aggressive use, the riverbanks and infrastructure require some attention to enable moving forward just as successfully through the next 100 years. And that is the genesis of this Northville River Restoration and Riverwalk Framework Plan. Hundreds of hours of discussion and planning, distilled into a viable plan forward for Wayne and Oakland Counties (the two counties Northville straddles) and all the communities impacted by our pivotal headwaters position in the Middle Rouge River watershed.

The current timing of this is fortuitous, as this activity coincides with a rare trio of exceptional redevelopment opportunities: 1) Foundry Flask — an abandoned brownfield site, 2) The Downs — which will daylight 1100 linear feet of river, and 3) a new offering, "The Riverwalk". All three key projects will impact the river, the ecosystem, and the region. Northville is reaching out and detailing opportunities for interested funders at this transformative juncture.

This Framework Plan provides the business case components for the Key Goals and Projects to address the Site Conditions, Challenges and Opportunities identified herein.

SUMMARY OF BENEFITS

- *Lowered flood risks of the Northville Downs river channel sufficient to contain a 100-year storm event and to reduce undetained stormwater flow.*
- *Prevent the imminent collapse of historic cobblestone and concrete retaining walls to thwart adjacent property damage and prevent riverflow disruptions.*
- *Transform a brownfield site to a 9-acre River Park with Daylighting of 1100 linear feet of the river.*

- *Restoration of the daylighted river to improve water quality and habitat, reduce erosion and promote community and ecological revitalization.*
- *Enhance Regional Recreation/Quality of Life by creating a continuous path from Ford Field's "Riverwalk" to Wayne County's Hines Park trails.*
- *Establish Northville as the "hub" for local, regional, and state shared trails to Northville Township's Legacy Park, Hines Park, Fish Hatchery Park, Maybury State Park, and Novi's Rotary Park.*
- *Repair crumbling outfall pipes. Restore streambanks at the confluence of the Randolph Creek and Walled Lake Branch. Establish a "Serenity Point" for public enjoyment.*
- *Erosion control. This large but critical activity is vital to slope stabilization, environmental/habitat improvements, and would employ riparian vegetation species, boulders, riprap, etc.*
- *Stabilize non-riverbank areas by minimizing discharge of sediment and pollutants, especially from parking lots and contaminated sites.*
- *Upper and Lower Mill Pond evaluation to address existing and future sediment loading. Otherwise, it will continue to deepen, creating odors in residential neighborhoods.*

The City*, in partnership with its private and public partners, is poised to begin implementing Key Projects in this Framework Plan. Cost estimates and priorities will be identified in a related document, referred to as *The Implementation Plan*.



*Northville hereinafter will be referred to as "The City"

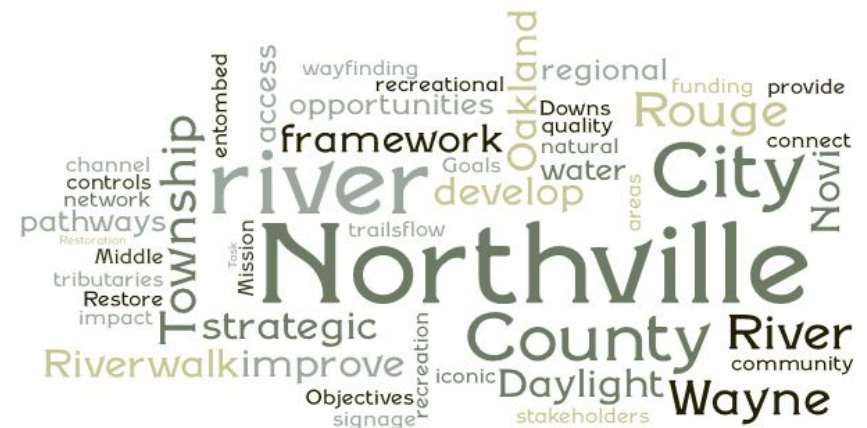
B. Mission Statement, Goals and Objectives



In 2020, the Northville City Council established the Northville River Restoration and Riverwalk Task Force. Since then, the team has worked closely with local, county and regional representatives to ensure that it achieves the community's goals for economic development, clean water, recreational opportunities, walkability and regional connectivity. Appendix I. lists the members of the Task Force, Stakeholders and River Stewards. Once formed, the first step of the Task Force was to define its Mission, Goals and Objectives which are provided below.

Mission Statement

The City of Northville Middle Rouge River Restoration Task Force will develop a strategic framework to improve the ecological health of the river and its tributaries within The City, and to expand community access and recreation with a network of parks, trails, and pathways called “The Riverwalk”.



Goals and Objectives

1. **Restore, preserve, and protect** the Middle Rouge River and its tributaries within The City of, using best practices of river system conservancy and stewardship.
 - a) Restore natural habitats and riparian buffers using native vegetation and erosion/sediment controls.
 - b) Improve stormwater infrastructure, flood controls and flow dynamics to improve water quality and river capacity.
 - c) Collect, organize, and analyze natural and physical site data and characteristics that impact the waterways.
 - d) Relocate existing public utilities that interfere with water flow or endanger water quality.
 - e) Daylight and restore the segment of the river, which currently flows under the racetrack property.

3. Enable an **aesthetically beautiful network of linked non-motorized pathways** and trails to improve access to the river and connect The City to nearby regional recreation areas.
 - a) Provide passive and low-impact recreational opportunities for users of all ages and mobilities through context-sensitive design to ensure safe and enjoyable access.
 - b) Incorporate outdoor interpretive signs and viewing areas for students and lifelong learners.
 - c) Research and pursue funding opportunities to finance desired improvements and long-term maintenance of “The Riverwalk”.

2. Develop a **strategic framework plan through collaboration** with The City, Northville Township, Novi, Wayne and Oakland counties, regional and state agencies, organizations and stakeholders.
 - a) Develop a strategic framework, with concept plans and operational and funding options.
 - b) Seek input from residents, businesses, and other stakeholders throughout the planning process.
 - c) Develop and implement a robust communications program.
 - d) Ensure strategic framework is consistent with the City’s Non-Motorized Infrastructure Plan and regional trail and pathways initiatives.

4. Generate opportunities that provide **economic and recreational benefits** for The City.
 - a) Promote the redevelopment of underused and obsolete properties consistent with our Mission.
 - b) Create “The Riverwalk” marketing and branding campaign.
 - c) Provide wayfinding tools to help visitors navigate The Riverwalk and connect to community assets and the historic downtown district.

C. The Study Areas

The Framework Plan provides detailed information for river restoration and pathways within the City of Northville, which is referred to as “The Declared Study Area”. Figure 4 shows a more detailed view.

The scope of the Declared Study Area begins at Baseline Road near the Northville Cider Mill. Moving south through the Upper Mill Pond, it follows the one mile long, riparian corridor as it meanders south to join the Hines Park regional park system at Seven Mile Road. It also includes Johnson Creek from western Fish Hatchery Park, up to the point where it joins the Walled Lake Branch at Seven Mile Road.

To incorporate connectivity plans with the City of Novi and Northville Township (in Oakland and Wayne Counties), a “Cooperative Study Area” was also defined (See Figure 1). The responsibility for completing the detailed analysis of the Cooperative Study Area outside the City’s boundaries rests with the City of Novi and Northville Township. However, the Framework Plan does anticipate both high level challenges as well as opportunities for implementing that connectivity (for example, complex topography challenges, presence of railroad tracks, intersection design, etc.)

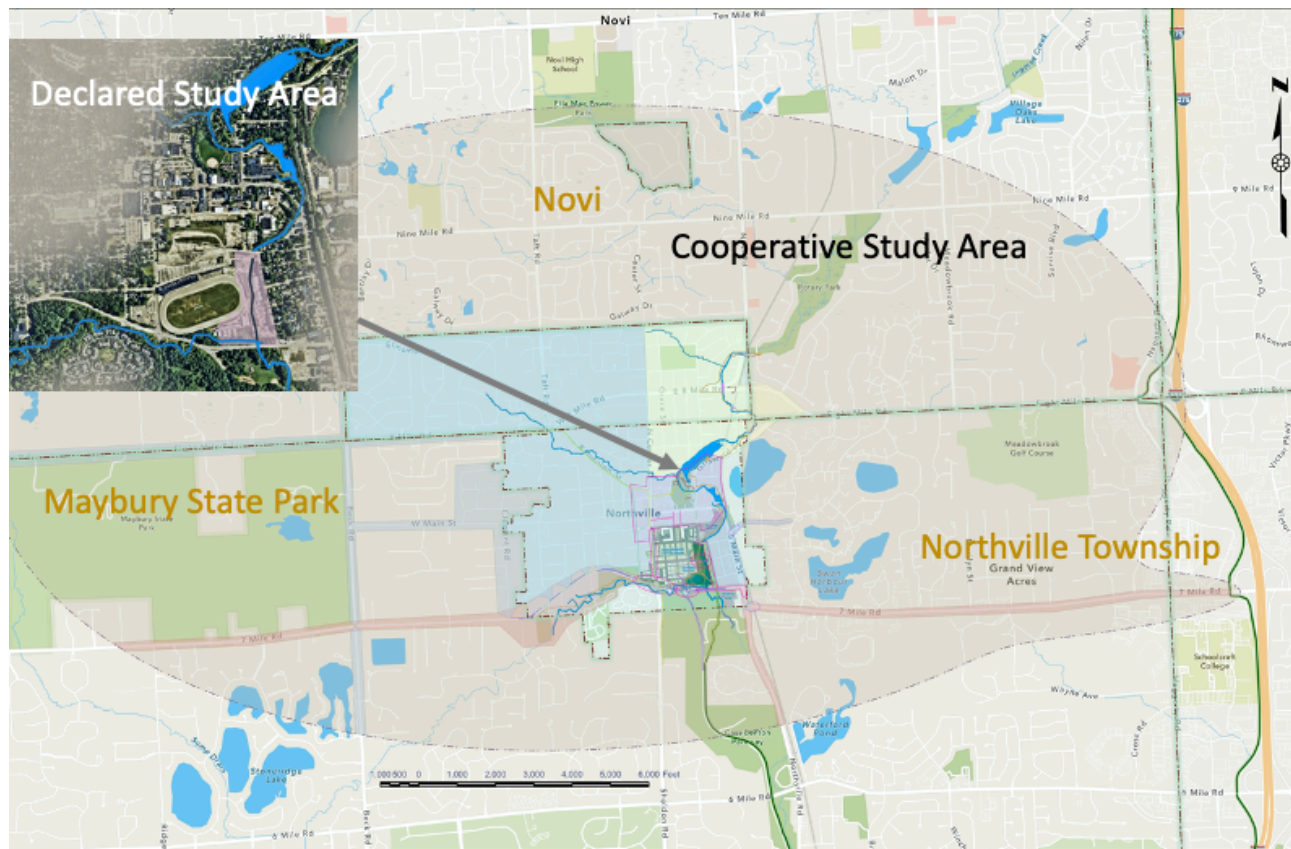


Figure 1. Declared and Cooperative Study Areas

D. Waterways

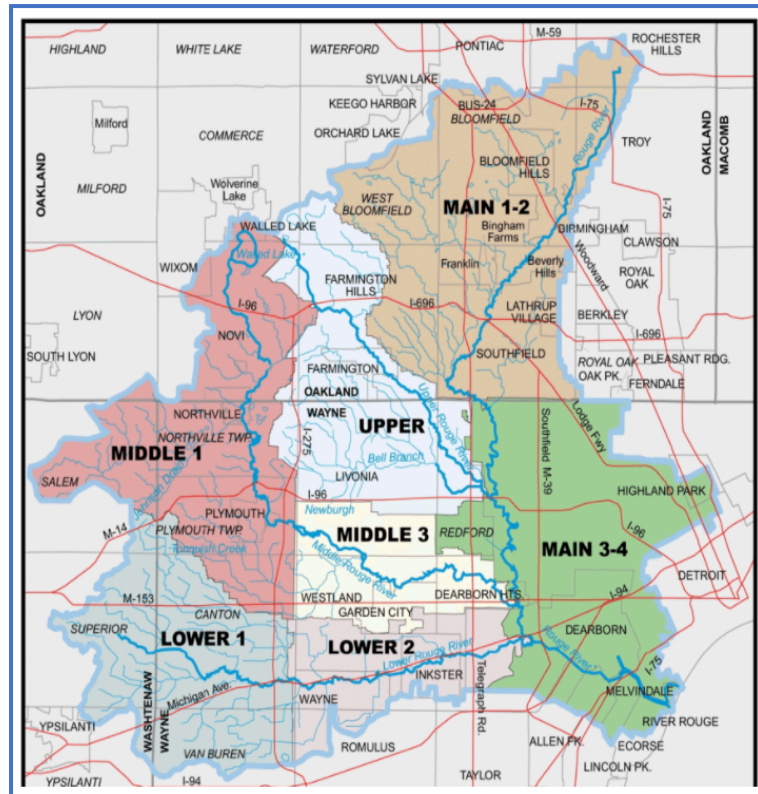


Figure 2. Rouge River Watershed.

1.Regional/County

The Middle 1 Rouge River sub-watershed covers nearly 80.6 square miles. Three counties (**Washtenaw, Wayne and Oakland**) are part of the overall watershed, and the land is more than 50% urbanized, less than 20% agricultural and less than 25% remaining undeveloped. (source: Alliance of Rouge Communities, and Friends of the Rouge).

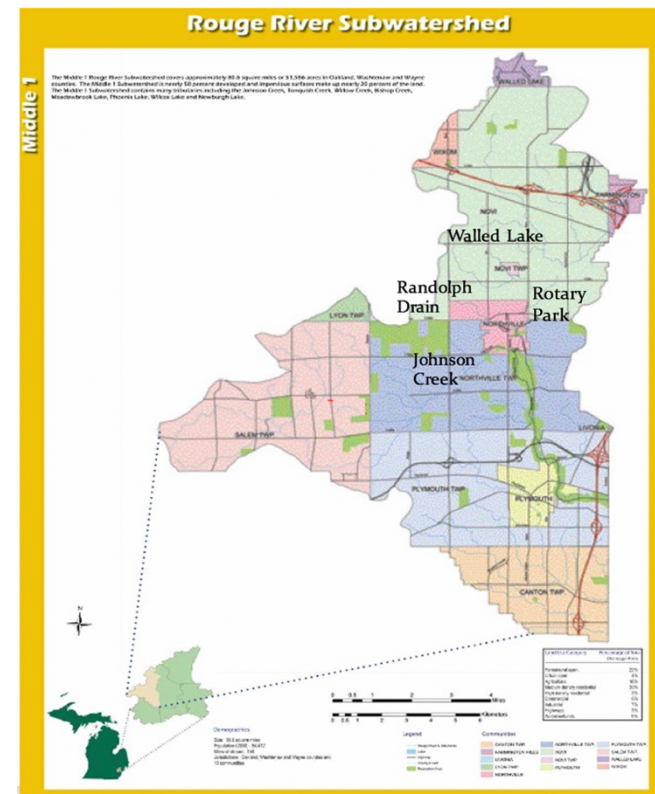


Figure 3. The Study Areas are located in Middle 1 Sub-watershed.

The Declared and Cooperative Study Areas are in the headwaters area of the Middle Branch of the Rouge River watershed. This key position exerts a direct influence downstream on the Rouge River, which was declared an Area of Concern (AOC) in 1987 under the U.S–Canada Great Lakes Water Quality Agreement. The surface water quality, flow characteristics, and ecological health of these headwaters are critical to improving the overall health of the Rouge River AOC.

2. Northville Waterways

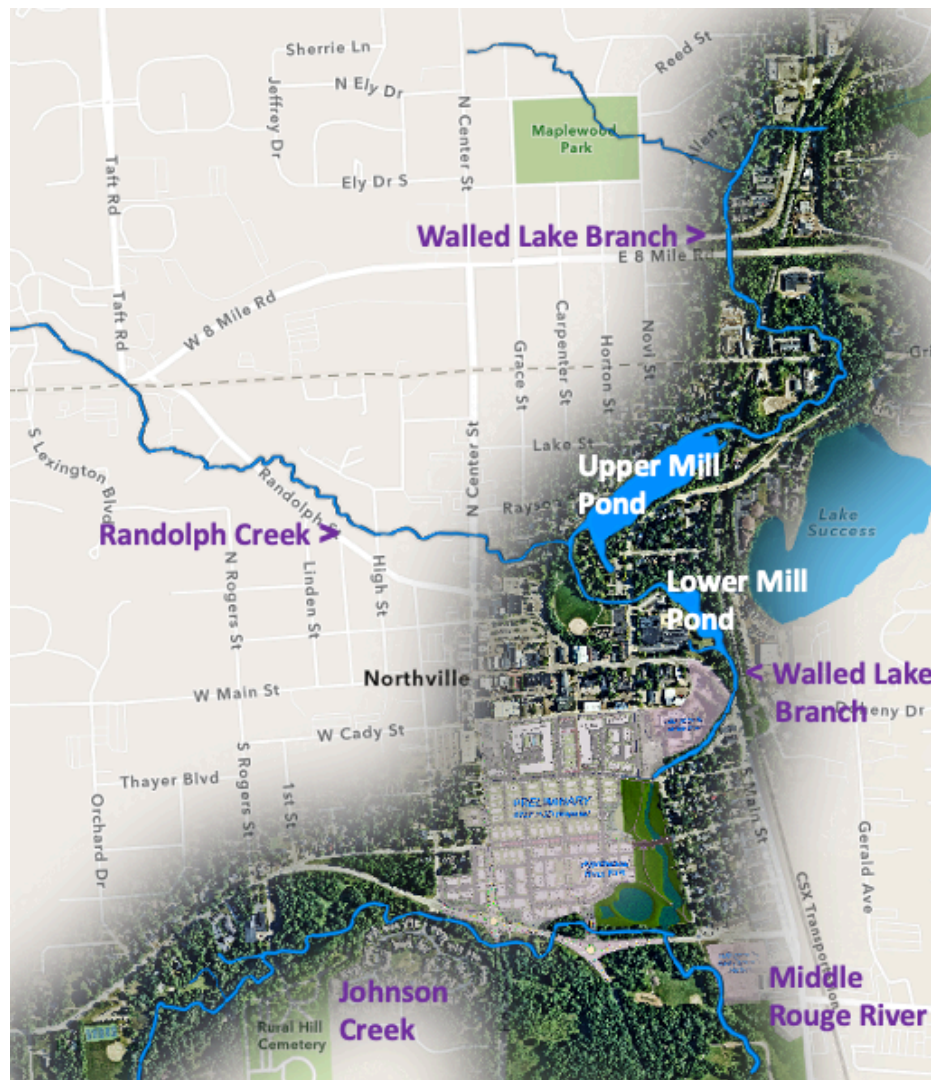


Figure 4. Northville Waterways (also known as Declared Study Area)

The Middle Rouge River originates within the City of Northville, following the convergence of three tributaries: The Walled Lake Branch, the Randolph Creek, and Johnson Creek.

The Walled Lake Branch of the Middle Rouge River originates in Oakland County and enters The City in its northeast quadrant, in the vicinity of Novi Road and Allen Drive. Prior to entering The City, the Walled Lake Branch flows through Novi's Rotary Park, a proposed connection within the Cooperative Study Area. The Walled Lake Branch flows primarily through mixed commercial and residential areas of The City in a predominantly southerly direction. It terminates at its confluence with Johnson Creek in the southeast area of The City, where the Middle Rouge River is formed. The Walled Lake Branch flows through the Upper Mill Pond and Lower Mill Pond and includes the buried section of waterway that is subject of the proposed daylighting effort.

While the Walled Lake Branch is the dominant waterway in the Designated Study Area, there are two additional tributaries of note within the city: Randolph Creek and Johnson Creek.

The Randolph Creek enters The City in its northwest corner near Beck Road and Elmsmere Drive. The Randolph Creek flows primarily through residential neighborhoods and commercial areas in a southeast direction and terminates at its confluence with the Walled Lake Branch at Ford Field West.

Johnson Creek, which flows into the south section of The City from Salem Township to the west, forms a second confluence in The City with the Walled Lake Branch south (i.e., downstream) of the proposed daylighting project. This combined channel flows under Seven Mile Road and connects with the Hines Drive portion of the Middle Rouge River.

The Johnson Creek is significant as it is the only creek in Wayne County to support a cold-water trout population.

E. History and Site Conditions

1. History

Settlers began to arrive in Northville, Michigan in the early 1800's. Between that period and the early 1900's, the town began to prosper with many types of industries and businesses emerging. Because horses were the predominant means of travel, livery stables and blacksmith shops were present. Dry goods, farming and furniture-making were other examples of businesses that thrived. Lumber and grist mills were established in the vicinity of the river, and in many cases, the river was diverted to provide the hydraulic power needed to run the mills (see Figure 5). Figures 6 and 7 show the various interpretations of the river configurations during the mid-to-late 1800's. Figure 8 shows the river as it exists today.



Figure 5. Northville Flour Mill 1847



Figure 6. 1860 GHS (pub) Wayne County

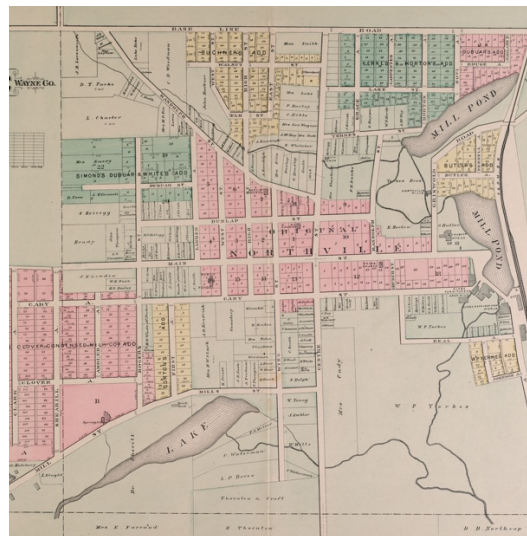


Figure 7. Sauer Atlas of Wayne County 1893



Figure 8. Northville 2021

2. Site Conditions

This section represents a summary of the Task Force's findings on site conditions. This information was obtained through a review of public records, field observations and interviews with local experts. Details can be found in Appendix II.



Figure 9. Brown Trout (source: Michigan.gov)



Figure 10. Aerial view of Upper Mill Pond sediment island

KEY FINDINGS

- A water quality monitoring study conducted by Alliance of Rouge Communities (ARC) from 2014-2017 suggests that the Middle 1 watershed is returning to a more natural hydrologic system. (+)
- Diversity of aquatic species is some of the best in the watershed. (+)
- Three Beneficial Use Impairments still exist for the overall Rouge River watershed and require infrastructure and habitat improvement projects to rectify. (-)
- ARC concluded that remaining impairments are likely due to:
 - Lack of appropriate substrate
 - Flashy stream flows
 - Lack of connectivity
 - Poor riparian zone management
- Annually, more than 30 million gallons of undetained stormwater is discharged from the Downs property into the Walled Lake Branch and Johnson Creek (assuming 33" annual rainfall). (-)
- Streambank erosion was identified in several areas. (-)
- Sediment deposits in both Mill Ponds are growing worse. At times, the waters emit odors near residential areas. (-)
- EGLE records indicate industrial use in several locations. (-)
- The CSX Railroad track is present in several sites in both Study Areas. (-)
- Ford Field amenities have deteriorated.
- Ten parking lots are located within or near the waterways. (-)
- Sidewalks and bicycle paths are missing (locally and regionally.) (-)

Note: (+) refers to positive and (-) is negative

F. Challenges and Opportunities

This section summarizes the Task Force's findings on Challenges and Opportunities. Information was obtained through a review of public records, field observations and interviews with local experts. Details can be found in Appendix III. Certain projects will require planning and engineering studies to fully define the issues.

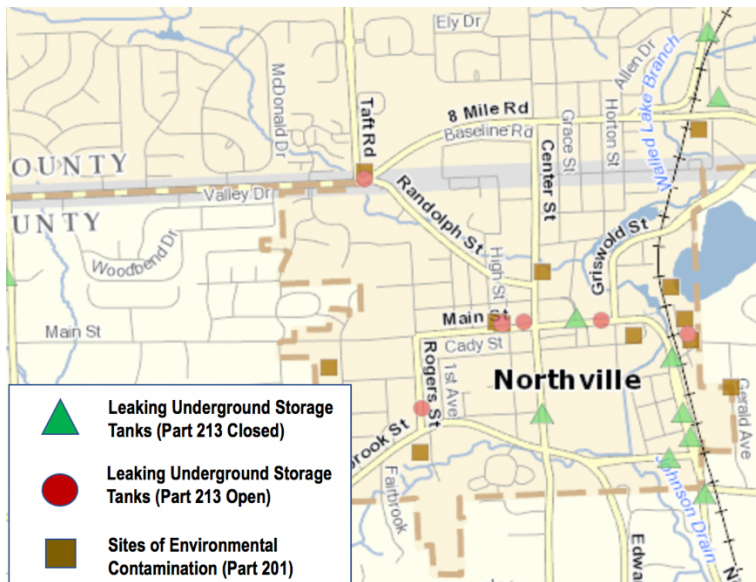


Figure 11. Sites with current and/or previous contamination (Source EGLE Mapper)



Figure 12. Northville Downs underground channel

CHALLENGES

- Years of industrial uses along the river will require remediation to address contaminants, such as PCB's.
- Water control devices, such as the Downs underground channel and the two Mill Pond spillways interfere with fish passage, a healthy ecosystem and habitat. Sediment build up problems need to be addressed.
- Long term, average annual precipitation is increasing.
- Large precipitation or snow melting events create rapid or "flashy" flows, which leads to further erosion.
- Most of the streambanks lack appropriate riparian vegetation, causing stormwater and sediment to wash into the river.
- Some streambank retaining walls are on the verge of collapse.
- Throughout the waterways, utility pipes can be found extending across the river channels. Risk of sewage discharge is possible if sanitary lines with this configuration are damaged.
- In its natural state, the river used to flow through areas of Ford Field which, in present day, is now active park land. Soil borings and a Master Plan will be needed to design permanent structures such as restrooms, pavilions, and other amenities.
- Barrier free access is hampered by topography, creating mobility challenges for elderly, people on walkers or wheelchairs and parents with strollers.
- Invasive plant species are present in the City's parks.
- Private property easements may be required for shared use paths.
- City building ordinances may not be entirely effective in providing protection for riparian corridors.

CHALLENGES



Figure 13. Flashy Flows in Walled Lake Branch due to snow melt



Figure 15. Cobblestone retaining wall undermined by river



Figure 14. Deteriorated staircase from Hutton St. to Ford Field West



Figure 16. Utility crossing within river channel



Figure 17. The Downs

OPPORTUNITIES

- Underutilized and blighted properties are located in the Declared Study Area, and some are eligible for brownfield program funding and potentially Superfund financial support.
- The City owns several acres of contiguous park space which will enable a continuous riverwalk.
- The Northville Downs and Foundry Flask developers are willing to partner with The City to allow a riverwalk on their properties, which are adjacent to The City's park space.
- Significant community support for daylighting the river was identified through surveys.
- The Downs project is proposing to daylight 1,100 linear feet of the river and includes a 9-acre park.
- Future restoration of the river channel is designed for a 100-year storm event, which will reduce flood risks, not just in the City of Northville, but also in communities downstream including Northville Township, Plymouth Township, Plymouth, Livonia, Westland, Dearborn Heights, Dearborn, Redford and Southwest Detroit.
- Habitat can be improved through several interventions at the Downs and the two Mill Ponds.
- Erosion can be addressed by stabilizing slopes using riparian vegetation species, boulders, riprap, etc. and by using green infrastructure such as rain gardens, bioswales and pervious pavement for paths and parking areas.
- The following measures were recommended by ARC to improve surface water quality to better support aquatic biota:
 - Improve stormwater management to decrease flashy flows, increase base flow and improve stream temperatures.
 - Address connectivity for better fish passage.
 - Establish riparian management ordinances.
 - Address E. coli pollution sources.
- Northville Township and the City of Novi have expressed interest in creating shared paths between their parks and The City.

G. Key Projects Locations and Descriptions

1. Seven Mile Shared Use Path – Maybury State Park to Fish Hatchery Park
2. Johnson Creek Riverwalk
3. Seven Mile Shared Use Path – S. Main to Legacy Park
4. New Farmers' Market
5. Northville Downs
6. Foundry Flask and DTE
7. Ford Field East
8. Ford Field West
9. Mill Race Village
10. Mill Pond
11. Mill Pond Trail
12. Historic Site Markers
13. Utility and Manmade Structures (Site wide)

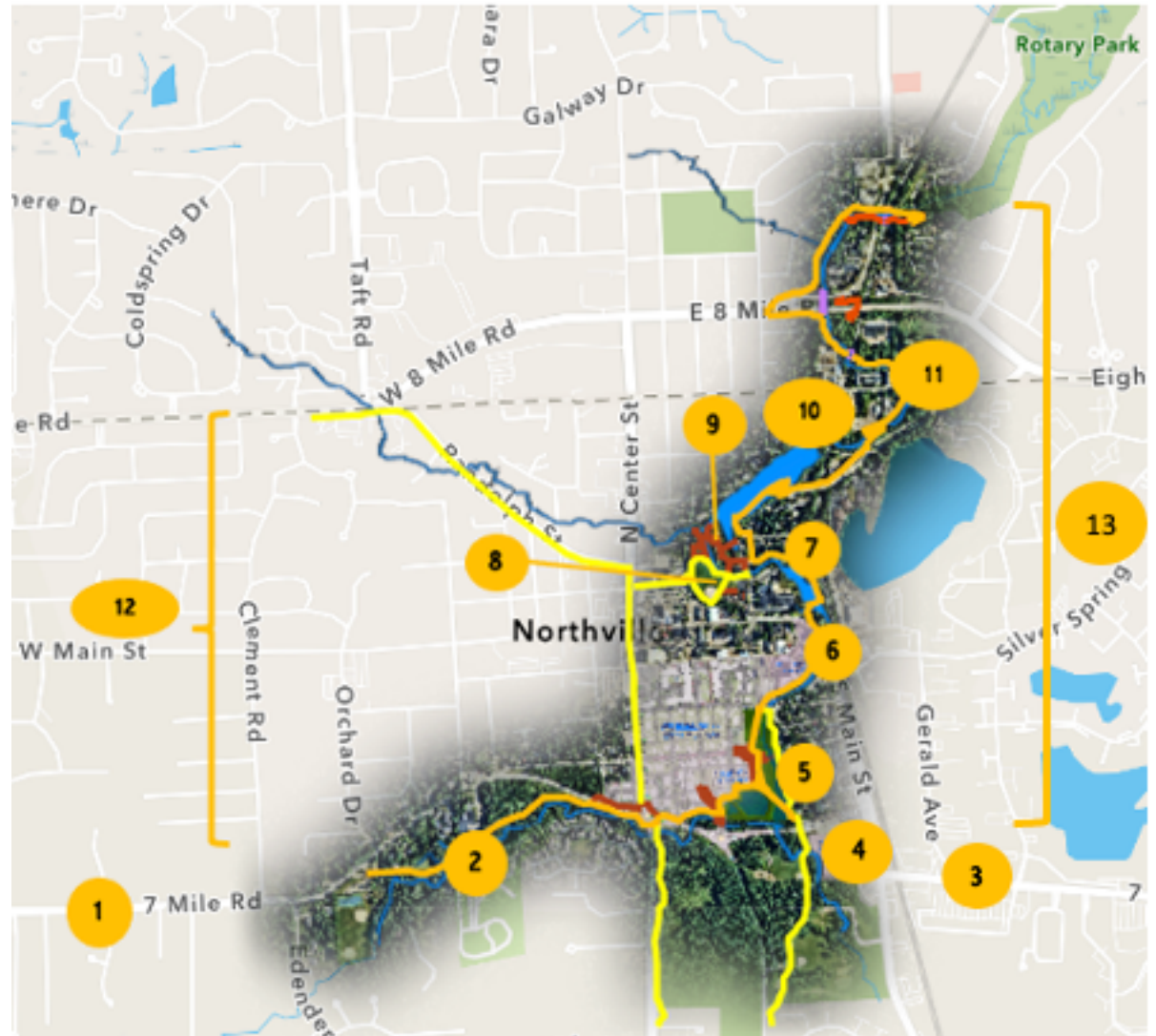


Figure 18 Locations of Key Projects in Declared and Cooperative Study Areas

Table 1. Key Projects: Summary Descriptions

Project Location & Name		Description
1.	Seven Mile Shared Use Path: Maybury Park to Fish Hatchery Park	Provide non-motorized paths from Northville to proposed 7 Mile entrance to Maybury State Park.
2.	Johnson Creek Riverwalk	This creek is the spawning grounds for brown trout and other fish species. The proposed riverwalk would connect the Northville Downs Riverwalk to the Fish Hatchery Park.
3.	Seven Mile Shared Use Path – S. Main to Legacy Park	Provide non-motorized paths from Northville to proposed 7 Mile entrance to Northville Township's Legacy Park.
4.	Northville Farmers' Market	The proposed market, sustainably designed, features an indoor/outdoor structure to support year-round activities.
5a.	Northville Downs Park, Daylighted and Restored River	The project includes daylighting and restoring a 1200 ft section of river. The river will meander through a large park which will feature a Riverwalk.
5b.	Research Preservation of Log Cabin	Investigate the feasibility of preserving the historic structure at 318 River St for a rest station and public bathrooms.
5c.	Stormwater Management & Flood Control	Identifies the stormwater discharge reduction contribution of the developed Downs project.
6a.	Foundry Flask Riverwalk	Provide pathway through proposed redevelopment facilitating connectivity between Ford Field East and the Downs property
6b.	Streambank Stabilization	Addresses key retaining walls in the vicinity of the Foundry Flask property that are on the verge of collapsing.
6c.	DTE Riverwalk	Riverwalk provides connectivity between Foundry Flask and Downs property.
7a.	Master Plan Ford Field East	This underutilized area can be developed as a passive park.
7b.	Ford Field East Riverwalk	Construct a ten-foot asphalt riverwalk and foot bridge along the lower dam mill pond next to the former Ford Valve Plant connecting Ford Field West and the Foundry Flask site.
7c.	Lower Mill Pond Restoration	Dredge Lower Mill Pond. Construct fish ladder at dam location to increase habitat connectivity upstream and downstream.
8a.	Master Plan Ford Field West	Construction of identified amenities will require planning and engineering services
8b.	Barrier Free Gateway	Install a handicap-accessible entry into Ford Field from Northville's commercial district.
8c.	Fort Griswold Play Structure	Repair existing structure or replace with a high-quality play system.
8d.	Restroom and Picnic Shelter	The City needs permanent restrooms and picnic shelter for planned programming and events.
8e.	Ford Field Riverwalk Restoration	Portions of two drainage pipes have collapsed and flow is impeded by debris. The secluded location of this portion of the river confluence is ideal for quiet reflection.
8f.	Randolph Creek Serenity Point and Bank Stabilization	Provide slope stabilization and riparian landscape planting to reduce erosion.
9.	Mill Race Village Green Initiative	Enhance landscaping and path design to reduce erosion from parking lot surface runoff.
10.	Upper Mill Pond Restoration	Dredge or re-channelize Mill Pond, construct mid-pond Riverwalk connecting Mill Race Village to Cider Mill site, construct fish ladder at dam location.
11.	Mill Pond Trail to Rotary Park 11a. Mill Race to Eight Mile Road 11b. Eight Mile Road to Rotary Park	The project aspires to connect and improve riverwalk paths, create wayfinding signage and markings, and improve safety at pedestrian and cyclist crossings. Project is complex due to topography, bridges and railroad crossings.
12.	Historical Site Markers	Historic structures and locations along the Riverwalk will be mapped using GIS software.
13.	Inventory & Assessment of Man-made Structures & Utility Crossings	Removal and protection of structures that inhibit natural stream function.

1. Seven Mile Shared Use Path – Maybury State Park to Fish Hatchery Park

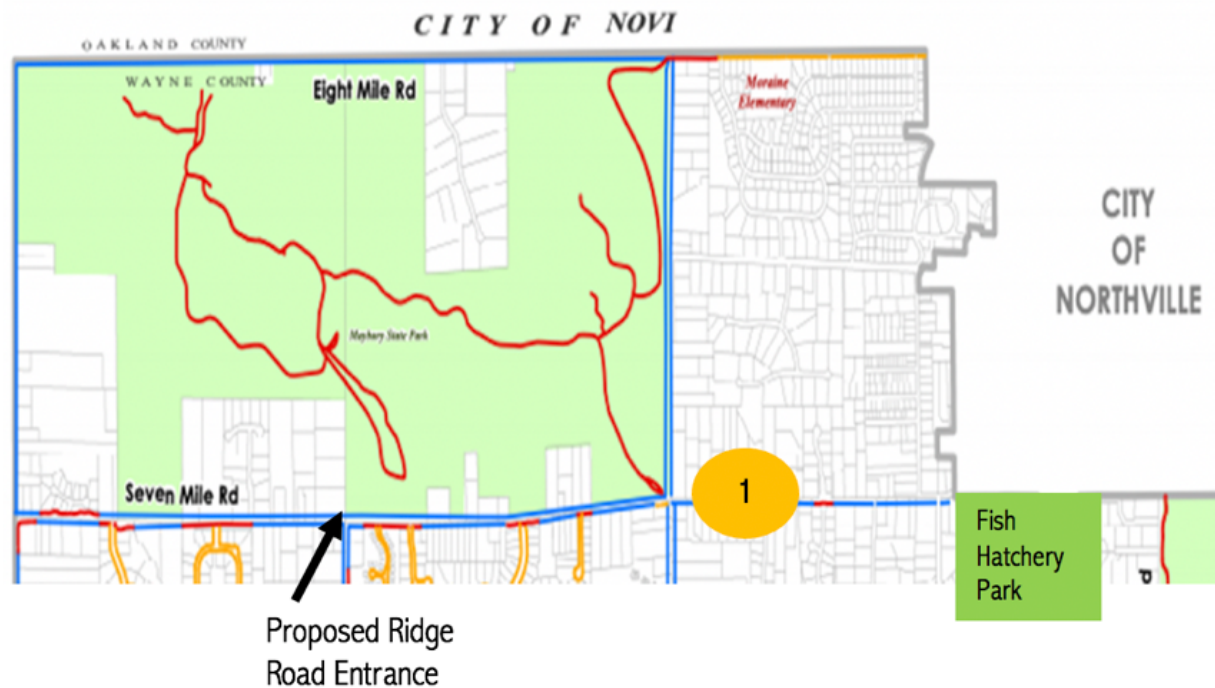


Figure 19 Maybury State Park

The Maybury State Park General Management Plan (Jan. 2020) calls for a non-motorized entrance to the park from Seven Mile Road. In October 2020, the Friends of Maybury group began raising funds for planning and engineering the entrance. At the same time, Northville Township's Non-Motorized Master Plan called for a 10-foot path along Seven Mile between the City of Northville (at Fish Hatchery Park) and out to Napier Road.

Seven Mile Road is under the jurisdiction of Wayne County. Posted speeds range from 35 to 40 to 45 mph. Land Use is largely residential along Seven Mile Road.

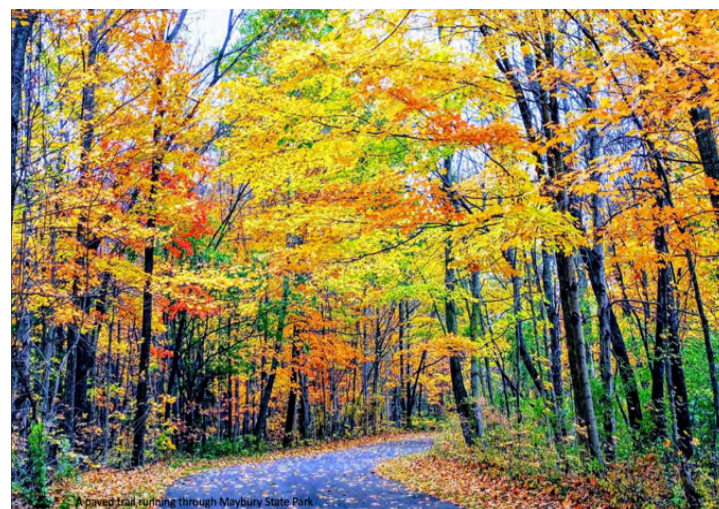


Figure 20. Maybury State Park interior path

2. Johnson Creek Riverwalk

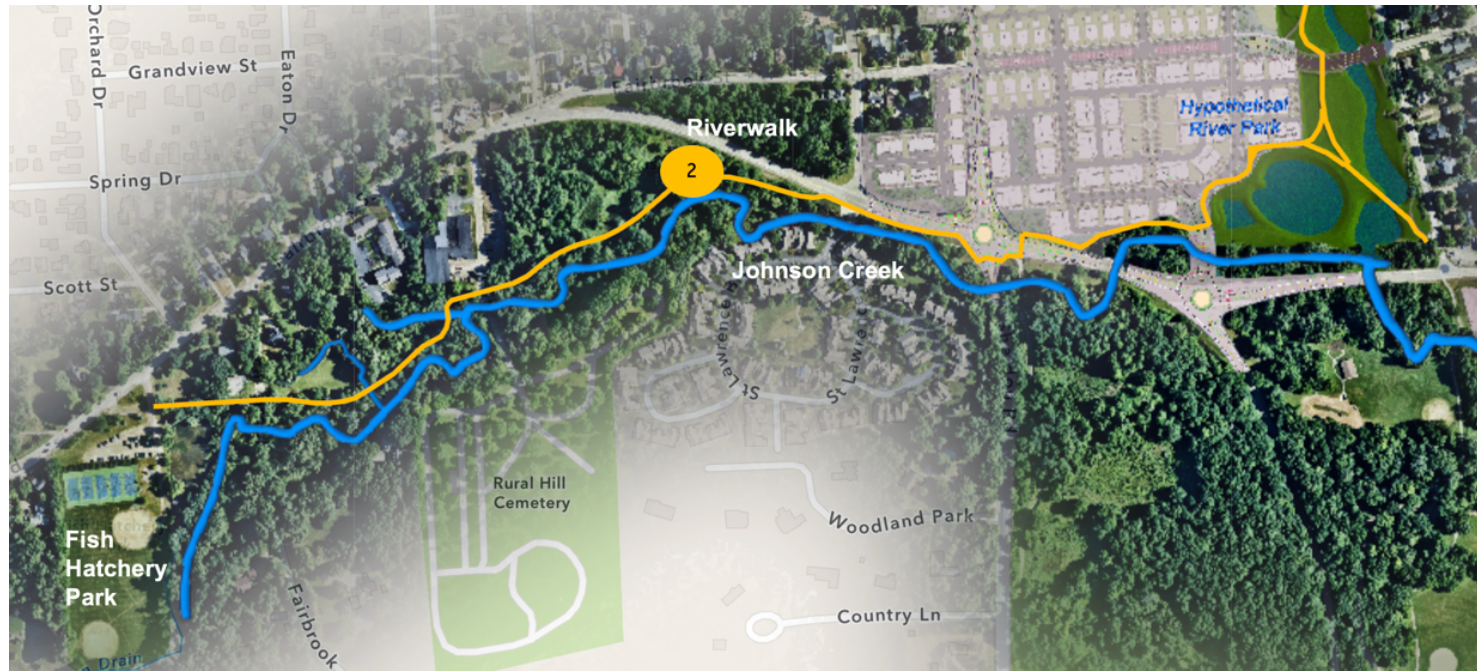


Figure 21. Johnson Creek south of Seven Mile Rd. between Sheldon Rd. and Fish Hatchery Park

One of the last cold-water springs in Southeast Michigan, this creek is the spawning grounds for brown trout and other fish species. The proposed riverwalk would connect the Northville Downs Riverwalk and Hines Park, running west to the historic Fish Hatchery Park. It would also facilitate connectivity to Maybury State Park described in Project 1.



Figure 22 Fish Hatchery Park following 2020 restoration

3. Seven Mile Rd. Shared Use Path – S. Main to Legacy Park



Figure 23. Legacy Park

In December of 2009, Northville Township sold bonds to purchase 332 acres of property along Seven Mile Road (formerly known as the State of Michigan Regional Psychiatric Hospital) for the purpose of preserving open space and creating future recreation amenities. Following several months of developing schematics and gathering public input, a master plan was created that divided the property into 6 recreational areas, each with their own unique identity and amenities. More detail on this high-quality park can be found on Northville Township's website.

This park is in the Cooperative Study Area. Plans are underway to provide connectivity between the City of Northville and Legacy Park that would create a regional recreational asset. Northville Township has constructed plans for the path and identified required easements. The path route is shown in Figure 25.



Figure 24. Railroad crossing at Seven Mile and Northville Road.

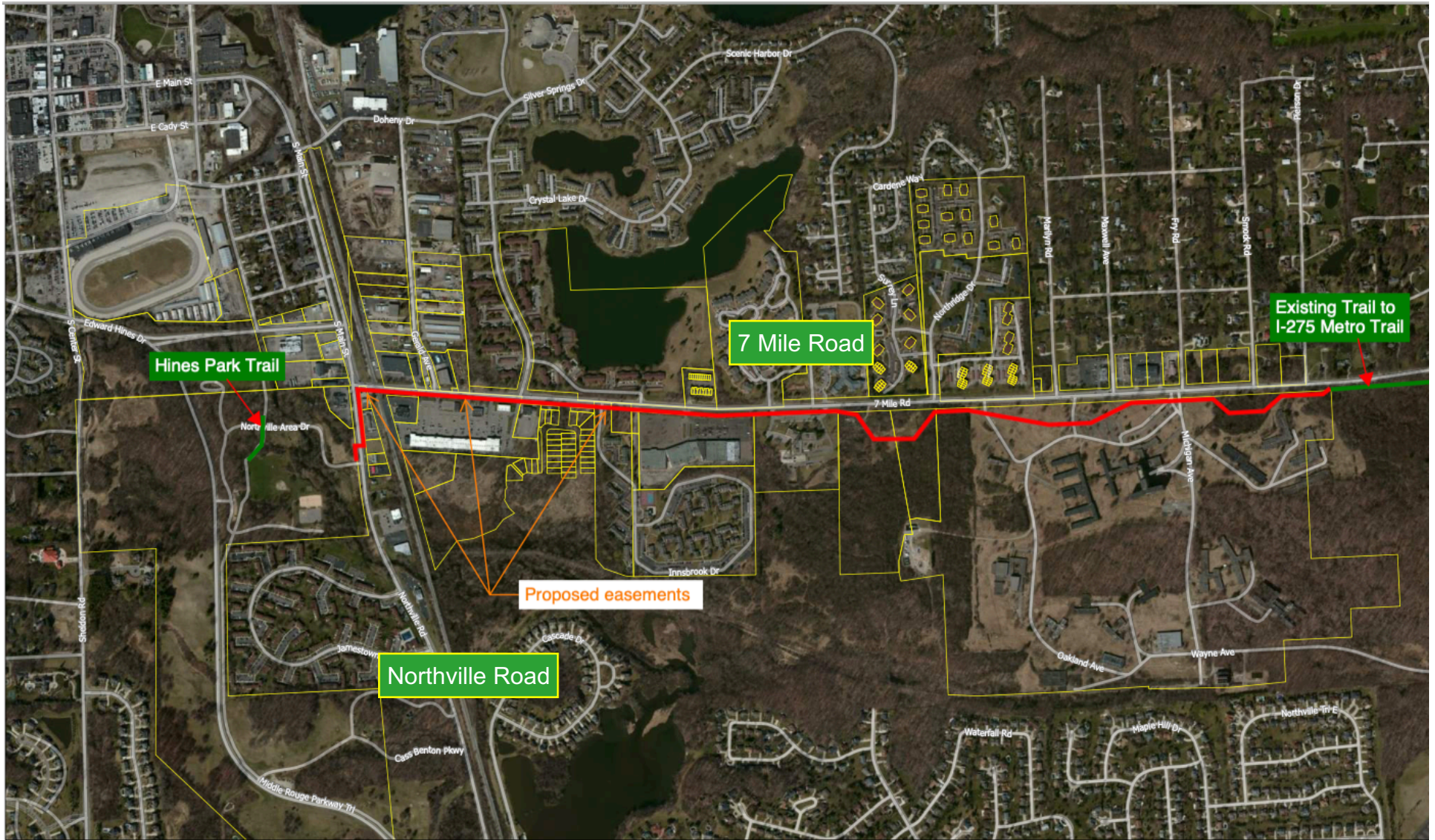


Figure 25. Current design and route of Seven Mile Road Shared Path (Source: Northville Township)

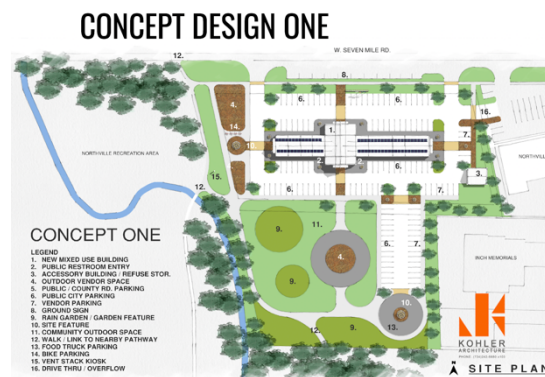
4. Northville Farmers' Market

The Northville Farmers' Market is currently located at the corner of Sheldon and Seven Mile Roads. With the upcoming development of the Northville Downs property, the market will be displaced. Current efforts to identify a new location have been researched by the Farmers' Market Task Force. The new location under consideration is on the former McDonald Ford property, on the south side of Seven Mile Road, near Northville Road and adjacent to the Hines Park regional trailhead. This gateway location to the City presents a strategic opportunity to make better use of this vacant lot.

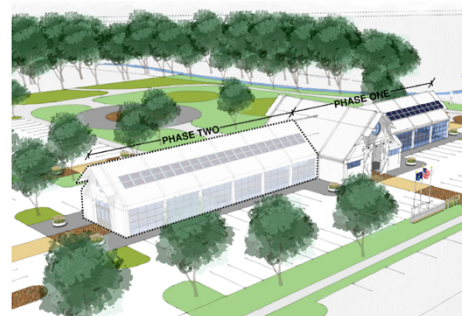


Figure 26. McDonald Ford site is a proposed, new location for the Farmers' Market

Through the efforts of volunteer architects and designers, progress is being made on alternative designs for the property. Amenities include a year-round, indoor facility, outdoor market spaces, parking, event spaces and several green amenities to manage stormwater and protect the adjacent river.



CONCEPT DESIGN ONE - PHASING



Figures 27-29 Proposed Concepts for year-round Farmers' Market structure

5. Northville Downs



Figure 30. Northville Downs



Figure 31. Harness Racer

The Northville Downs Harness Racing track is located at the corner of S. Center Street and Seven Mile Road. This property has housed racetrack operations since 1944, when Northville Downs opened as the first nighttime harness racing track in Michigan. The Downs, as it is commonly known, was built on the site of the former Wayne County Fairgrounds where notably, Joe Louis trained in 1939 for his world championship later that year.



Figure 32. Northville Downs map

Background: The site consists of 48 acres and is bounded by Cady Street to the north, River Street to the east, Seven Mile to the south, and Center Street to the west. The intersection of Center Street and Seven Mile Road is the gateway into downtown Northville, and the Downs site is the most prominent gateway feature. A portion of the Middle Rouge River has been entombed under the racetrack for more than 50 years.



Figure 33. Northville Downs showing location of buried channel (see dark line on the east side)

The Northville Downs Redevelopment

Hunter Pasteur Homes, a private development company has an option to purchase the Downs property and is proposing a large urban in-fill mixed-use development, including single- and multiple-family housing options and retail/commercial space. The proposed concept plan, which is still being modified, is shown on the right.

The City's Brownfield Redevelopment Authority has identified the Downs as a known contaminated site. The Developer has conducted Phase I and II environmental studies and submitted them to the Michigan Department of Environment, Great Lakes, and Energy (EGLE). The developer has also conducted extensive stormwater and floodplain evaluations and studies of the site, resulting in a "Letter of Map Revisions" (LOMR) for the delineation of revised flood plain boundaries, which EGLE and Federal Emergency Management Administration (FEMA) approved.

Redevelopment of the Downs offers a once-in-a-lifetime opportunity for the city to implement its vision of a daylighted and restored river surrounded by parkland and recreational amenities, including a non-motorized pathway with connections throughout the city and to surrounding regional pathways.

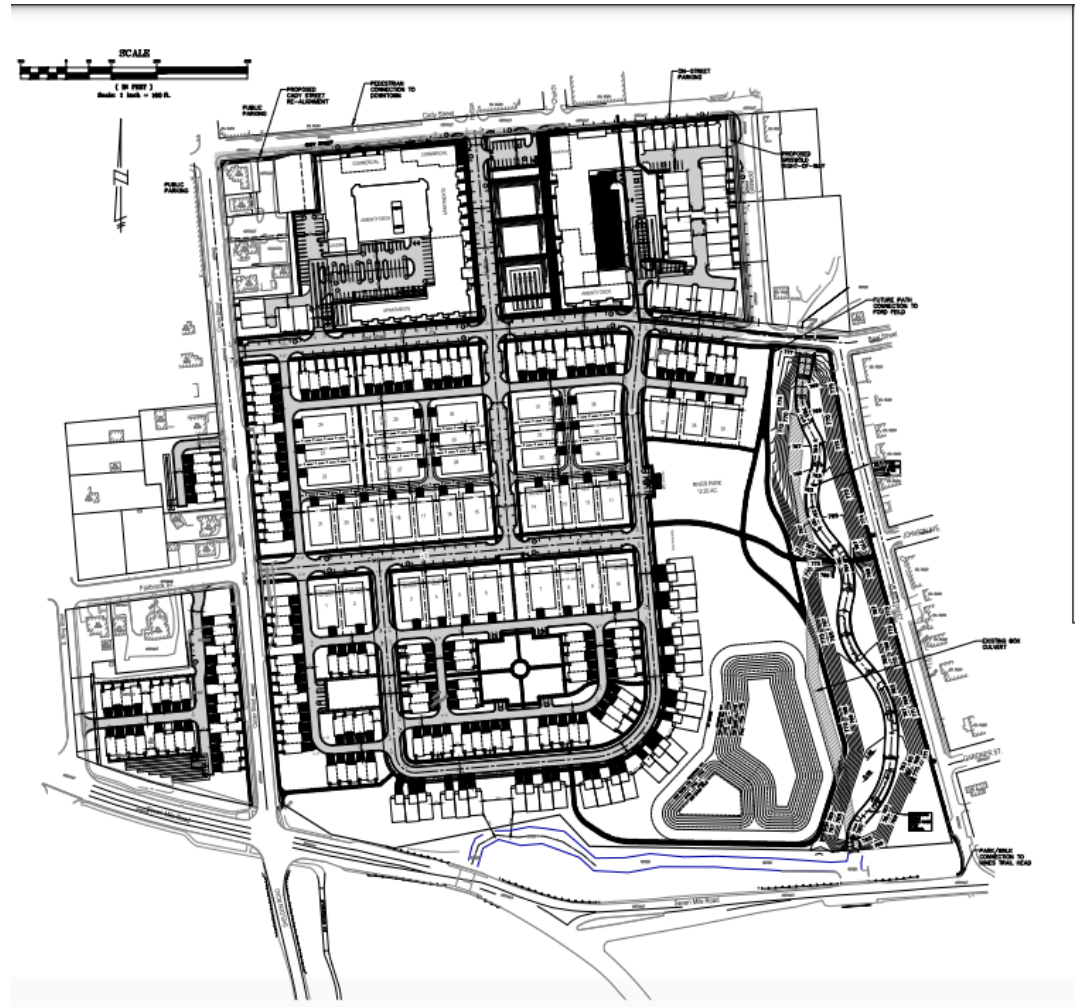


Figure 34. Hunter Pasteur preliminary site plan for Northville Downs (December 14, 2021)

Northville Downs Projects



Figure 35. Northville Downs Key Project Sites

5a. Northville Downs Park, Daylighted and Restored River

5b. Research Preservation of Historic Log Cabin

5c. Stormwater Management and Flood Control

Detailed descriptions of these three projects are provided on the next two pages

Project 5a. Northville Downs Park, Daylighted and Restored River

Daylighting of 1,100 lineal feet of river will include the preservation of approximately 9 acres of open space for public parkland, which would include a non-motorized pathway, with connections to the Hines Park Parkway. The project will enhance recreational opportunities designed to reconnect residents to nature, increase property values, and support downtown businesses.

Natural restoration will create a natural, free-flowing channel with exposed bottomlands that will improve water quality, increase hydraulic capacity for downstream flood control, improve habitat, slow water velocity to reduce erosion, and promote community and ecological revitalization.

Project 5a consists of planning, engineering, design, construction, and landscape installation. Sub-projects include:

- An existing sanitary sewer line, which currently runs through the underground channel will be relocated under the channel bottomlands to prevent potential leakage of raw sewage to the river.
- Removal of the culvert entombing the river, combined with major excavation of tons of concrete and other unwanted materials.
- Redirecting river from temporary location to new channel.
- Native vegetation and erosion/sediment controls will be designed to resuscitate the river's natural habitats and riparian buffers, improve spawning grounds, and provide protection against predators.
- Also recommended are a series of rock sills designed to absorb the change in grade, manage scouring of the riverbank, and allow fish passage between the daylighted river and Johnson Creek.
- Designing the park, daylighting the river to include paths, streambed and streambank design, riparian landscaping, bioswales and trees will require the assistance of a professional design team and a collaborative effort that brings together a variety of stakeholders.



Figure 36. View of underground channel entrance

Project 5b. Research preservation of historic log cabin

The log cabin currently located at 318 River Street was built 85 years ago built during the Great Depression. The original owner was Miss Mary Gilbert, and the Detroit contractor that built it in 1936 was P.L. Mott. The Task Force's sub-team has determined that the structure may be unique because of a 1936 patent of the Air-lock logs. Further research is being conducted to determine whether this may be the first home built with these newly patented logs. These logs are no longer produced today.

The Task Force supports the preservation of the cabin, but options for location, intended use and costs need to be researched.



Figure 37. Log cabin located on River Street

Project 5c. Stormwater management and flood control



Figure 38. Downs property showing large expanses of pavement

The 48-acre Downs site has large spans of impervious surface and gravel. Precipitation that falls on the site flows untreated into storm sewers and into the river.

Daylighting the river through natural restoration will reduce stormwater discharge into the Johnson Creek and Walled Lake Branch from more than 30 million gallons annually to 120,000 gallons. (Assuming 33" annual rainfall)

Natural restoration of the river channel is designed for a 100-year storm event, which will reduce flood risks, not just in the City of Northville, but also in communities downstream including Northville Township, Plymouth Township, Plymouth, Livonia, Westland, Dearborn Heights, Dearborn, Redford and Southwest Detroit.

6. Foundry Flask

Foundry Flask Northville has an extensive history in manufacturing and industry. The buildings at the eastern termini of East Main and East Cady Streets became known as “Northville’s manufacturing district.” By 1890, Northville was the third largest manufacturing center in Wayne County, behind Detroit and Wyandotte. The Foundry Flask property in the historic district was part of Northville’s industrial legacy. The Walled Lake Branch flows from the Water Wheel building across CSX Railroad property and then through the Foundry Flask site. For nearly 40 years, the property has been vacant.



Figure 40. Proposed Foundry Flask Mixed Use Development

A group of developers have purchased the former Foundry Flask. The proposed \$26 million project is being developed as a mixed-use development, featuring both residential and commercial space

Project 6a. Foundry Flask Riverwalk

Discussions are underway between the City and the Developer to provide an easement along the river to serve as a riverwalk. This portion of The Riverwalk is important because it serves as the linkage between Ford Field East and the Downs Riverwalk, which then in turn connects with the Wayne County Hines Park Trail system. The project includes streambank stabilization.



Figure 39 Foundry Flask

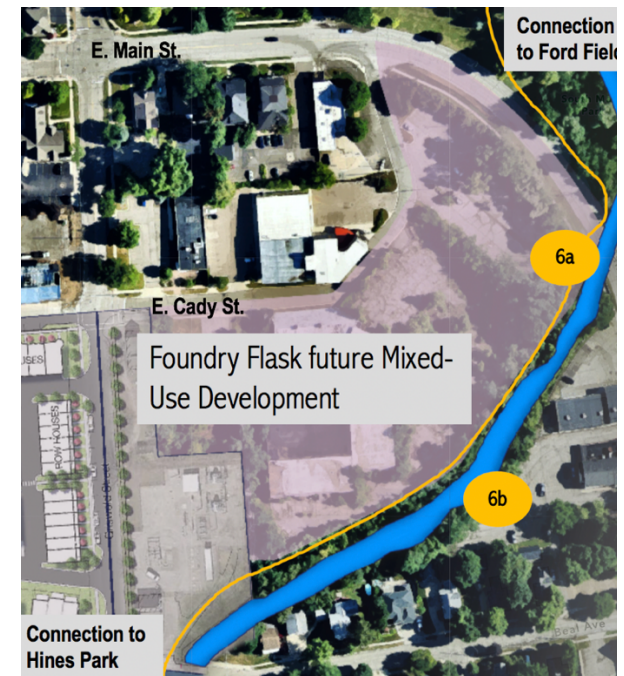


Figure 41. Foundry Flask Project Sites

Project 6b. Streambank Stabilization

As described in Appendix III Section 2, there are several walls on the opposite bank of Foundry Flask that are in great distress. Due to erosion, all the walls have been undermined and are in danger of collapse.

The existing concrete walls will likely need to be replaced. Every effort should be made to salvage the existing cobblestone walls in order to maintain their historic character. Restoring proper support is paramount to any of the walls that can be salvaged. Engineering studies should be initiated immediately.

Note: All retaining wall photos are along the South Bank of the Walled Lake Branch tributary, south of Foundry Flask between Northville Road and Beal Street.



Figure 42. Deteriorated concrete wall undermined by erosion. Active sanitary supported after being undermined.



Figure 43. Historic stone wall undermined due to erosion.

Project 6c. DTE Riverwalk

The Foundry Flask property shown on the right of Figure 44 is adjacent to the DTE Substation site shown on the left. Both properties are located on the north side of the West Branch. A short Riverwalk along the east side of the DTE site would connect the Foundry Flask Riverwalk with the Downs Riverwalk (not shown) directly to the south.



Figure 44. Aerial view of DTE Site

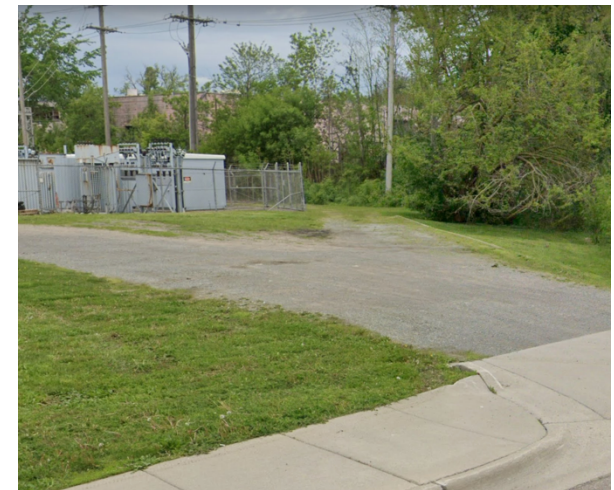


Figure 45. DTE property (Foundry Flask in background)

7. Ford Field East

Ford Field East is a 9-acre, largely undeveloped and underutilized parcel of land which is owned by the City of Northville. The park is accessible via a dirt road that is located on the east side of Griswold St. The second access point is across a bridge located east of the Planet Fitness entrance. There are no recreational amenities on this site. Along the east side of the property, there is an active PCB and oil treatment facility.



Figure 46. Parcel boundaries



Figure 47. Aerial photo of Ford Field East

The Water Wheel Centre Building: In 1919, Henry Ford established the Village Industry Project, which brought manufacturing jobs to rural areas and provided farm workers with a stable source of income. As part of this program, Ford purchased the Northville Mill property at East Main and Griswold Streets. Parking for employees was provided in what is now known as Ford Field West, a 6-acre park which is nestled along the Middle Rouge River. The park was enjoyed by Ford employees and became a popular tourist destination. The Middle Rouge River runs through this land, known as Ford Field East.

In 1936, Ford oversaw construction of a new 40,000 square-foot valve machinery plant, designed by renowned industrial architect Albert Kahn. The Ford Valve plant was used in the manufacture of tractor valves and components for Ford's Model T. The plant remained in operation until the late 1970s. Ford Motor Company donated the park in 1994.

Richard and Diane Cox purchased the vacant Valve Plant in 1994. They donated the 9-acres of land surrounding the building to the City of Northville to be used for parks and recreation. In 1995, the Coxes received recognition for the Ford Valve Plant when it was listed on the State and National Registers of Historic Places.

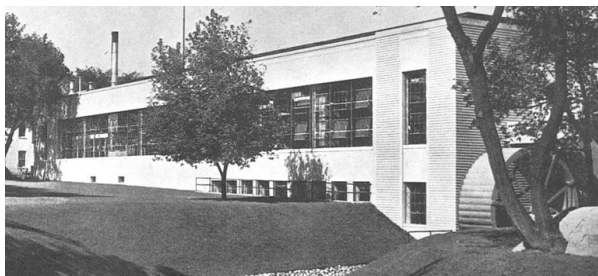
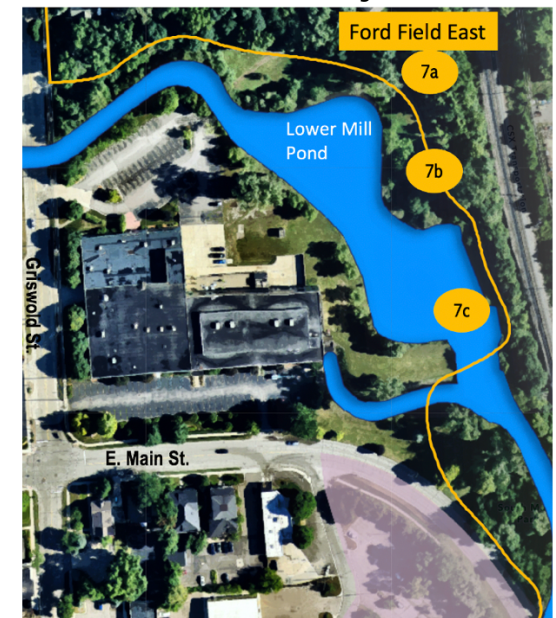


Figure 48. Ford Motor Company Valve Machinery Plant

Ford Field East Projects



7a. Master Plan Ford Field East

7b. Ford Field East Riverwalk

7c. Lower Mill Pond Restoration

Project 7a. Master Plan Ford Field East

This underutilized area provides a great opportunity to be developed as a passive park with a Riverwalk following the lower dam mill pond and spillway. The Riverwalk along this section would serve as an important connector to the Northville Downs area, the Foundry Flask site, and the Ford Field Riverwalk.

A Master Plan is needed for several reasons:

- 1) Land use restrictions are present on the east side of the property and there needs to be a detailed investigation on what options are available.
- 2) A feasibility analysis is necessary to determine where to locate the Riverwalk within the park. Pedestrian bridges are a possibility.
- 3) The City needs to determine whether it makes sense to dredge the Mill Pond and retain it as a pond, or restore the pond to a stream channel. A second component is to provide fish ladders for upstream and downstream passage.



Figure 49. Ford Field East

Project 7b. Ford Field East Riverwalk



Figure 50. Riverwalk Alternatives

Riverwalk (left). A 10-ft. Riverwalk path is proposed for Ford Field East. Depending on the path's route, one or two bridge structures will be needed to provide continuity with the Foundry Flask property.

Lower Mill Pond Restoration (right). Based upon the findings in the Master Plan noted above, Project 7c includes remediation clean-up, invasive species removal, riparian landscaping and habitat restoration.

Project 7c. Lower Mill Pond Restoration



Figure 51. Spillway at Lower Mill Pond

8. Ford Field West

Ford Field West is a 6-acre park in the heart of downtown Northville. The park is on former industrial sites donated by Ford Motor Company to the City. Amenities include a lighted ball field, playground area, accessible play structure, picnic tables and walking paths. The Walled Lake Branch runs through the park. The Parks and an amended Recreation Master Plan, identifies capital improvement for restrooms, a picnic pavilion, ball field improvements and new play structure.

The projects shown below responds to the challenges that are summarized in Section F and detailed in Appendix III.



Figure 52. Ford Field West



Figure 53. Ford Field West project sites

Project List

8a. Master Plan Ford Field West

8b. Barrier Free Gateway

8c. Fort Griswold Play Structure

8d. Restrooms and Picnic Shelter

8e. Ford Field Riverwalk Renovation

8f. Randolph Creek Serenity Point and Bank Stabilization

Project 8a. Master Plan Ford Field West

Ford Field West offers a valuable alternative for events that are conducted annually in the City of Northville. Further, there is growing demand from the community for more amenities and programming in the park. The Ford Field Task Force was formed in 2020 to address these and other needed improvements. Their mandate was to define strategies that would transform Ford Field West into a central park environment.

Phase 1 priorities are described in items 8b-8f. Phase 2 design priorities are improvements for greater park use and include landscaping and gardens, an interactive splash pad, lighting, seating and tables.

In addition to park amenities, the river and the riparian corridor need to be maintained and enhanced to reduce erosion. The Master Plan will also address these components.

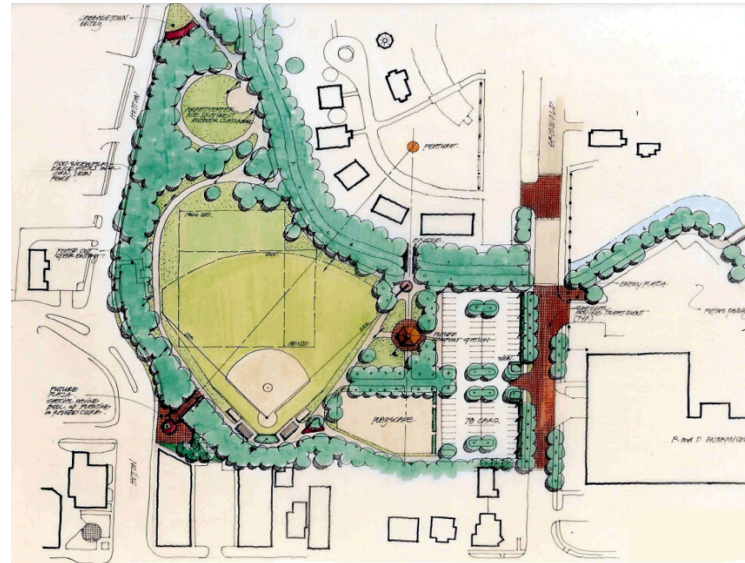


Figure 54. Concept drawing for future Ford Field

Project 8b. Barrier Free Gateway



Figure 55. Current staircase



Figure 56. Example of barrier free solution constructed on sloped topography

Figure 55 shows the wooden staircase that connects Ford Field West with downtown Northville at Hutton Street. This project intends to remove the old, obsolete staircase and install a handicap-accessible entry into Ford Field West. This gateway project will help make this site accessible by stabilizing the embankment and traversing a steep slope using ramps.

Project 8c. Fort Griswold Play Structure

The current play structure is enjoyed by residents of Northville, as well as members of surrounding communities. The structure needs significant repair or replacement.



Figure 57. Current Fort Griswold play structure

Project 8d. Restrooms and Picnic Shelter

Ford Field West does not have any permanent restrooms, and the City of Northville has few alternatives. Hosting a growing number of civic events requires a restroom station and picnic shelter. Separation of the shelter from the public restrooms helps to avoid conflicts between park users and residents who use the pavilion for private functions.



Figure 58. Pavilion concept

Project 8e. Ford Field Riverwalk Renovation

The Riverwalk in Ford Field West was installed decades ago and needs slope stabilization as well as landscape installation to restore the riparian edges.

In addition, pipes which intrude into the riverbed need to be evaluated and relocated, if possible.



Figure 59. Scouring and erosion in vicinity of stormwater discharge pipe.

Project 8f. Randolph Creek Serenity Point and Bank Stabilization

This site is located at the base of the sloped, Hutton neighborhood pathway entrance where the Randolph Creek enters Ford Field West. Two major drainage pipes empty into this location. Portions of the structures have collapsed, and flow is impeded by natural and man-made debris. The riparian edges are eroded and contribute sediment to the river during precipitation events.



Figure 60. View of confluence with Walled Lake Branch and Randolph Creek



Figure 61. Man-made and natural debris at the mouth of Randolph Drain



Figure 62. View of river from Serenity Point seating area.

The confluence of the Randolph Creek and the Walled Lake Branch is nestled in a secluded corner of the park, which makes it an ideal spot for reflection and meditation.

The site is approximately 60 ft. by 120 ft. In this corner, seating will be provided so that visitors can enjoy the soothing sounds of the river as it spills over the Upper Mill Pond dam and ripples over the riverbed's cobblestones.

The project for this site will clean up and repair the problems described above. Streambank erosion will be remediated with appropriate riparian plants, which will prevent stormwater from stripping the soils and washing sediment into the river.

Mill Pond Area Sites (Projects 9-11)



Project 9. Mill Race Village Green Initiative

Project 10. Upper Mill Pond Master Plan

Project 11a. Mill Pond Trail – Mill Race Village to Eight Mile Road

Project 11b. Mill Pond Trail – Eight Mile Road to Rotary Park

Detailed descriptions of these three projects are provided on the next two pages

9. Mill Race Village Green Initiative



Figure 63. Mill Race Village

Erosion issues starting in Mill Race Village are outlined in Appendix II Section 2. Current plans to minimize impacts to the adjacent waterway include the following:

- a. Creating 2-3 rain gardens within the property near the bottom of areas where the slope is steep. The rain gardens will include vegetation that can thrive in a moist environment and prevent major sediment from collecting on existing and new access points.
- b. Install bioswales adjacent to the gravel road that traverses through the property. Bioswales will be installed where the adjacent slope is steep. Bioswales perform like rain gardens but also have a perforated pipe at its bottom to provide positive drainage to a natural outlet or storm sewer. In the case of the gravel path to Ford Field, the natural outlet will be Ford Field.
- c. The banks along the south border of Mill Race (adjacent to Randolph Creek) are generally in disrepair due to erosion and the shady environment. Vegetation will be planted to assist with holding soil in place, minimizing erosion and resulting sediment.
- d. The gravel road, which is mainly used for pedestrian traffic, will be improved to maintain the historic feel of Mill Race. A different type of gravel will be used that can withstand the elements better while requiring much less maintenance. The current gravel has taken on so much sediment that the road gets very muddy, with standing water and not ideal for pedestrian traffic.

Mill Race Village is a 4-acre museum which is operated by the Northville Historical Society. The village contains several buildings from the 19th century, along with benches and a gazebo. The Walled Lake Branch runs along the western and southern perimeter of the village, and visitors have views of Mill Pond on the north end.

Mill Race Historical Village (Mill Race) is a major cornerstone to the Northville community and attracts visitors on a regular basis from the entire Southeast Michigan Region.

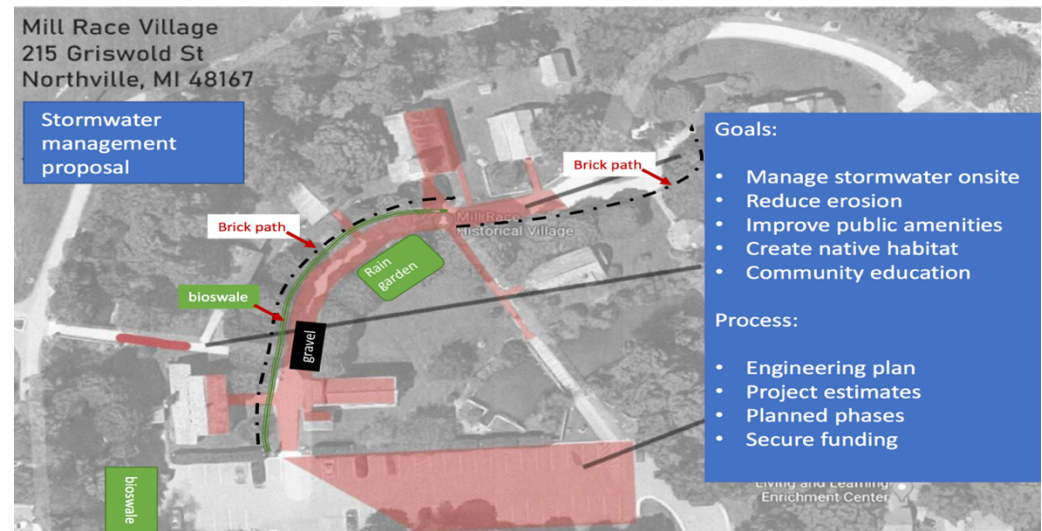
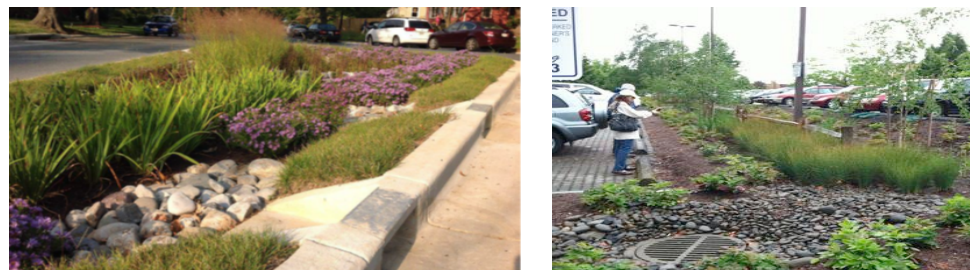


Figure 64. Concept Plan for Mill Race Village Stormwater Improvements



Figures 65 and 66. Examples of Proposed concepts for rain gardens and bioswales

10. Upper Mill Pond Master Plan



Sediment loading into this pond continues to be a problem. If there is no intervention, odors and irregular flows are likely to develop as the river attempts to obtain equilibrium flow around the sediment deposits.

This project investigates whether it makes sense to address the pond through dredging or to re-channelize the pond into a river once again. A separate component is to construct fish passage infrastructure. This Master Plan will guide future decision-making.

11. Mill Pond Trail to Rotary Park

This project is in the early stages of feasibility analysis. This aspirational project seeks to extend the Northville Riverwalk from Mill Race Village, north to Novi's Rotary Park. Project 11a (Wayne County) envisions a boardwalk that begins at the east side of Upper Mill Pond and continues north to Eight Mile Road. Project 11b consists of a trail running from Eight Mile Road to Rotary Park. The project involves multiple complex crossings over and under bridges, overpasses and railroad crossings.



Figure 68. Brighton riverwalk spanning pond

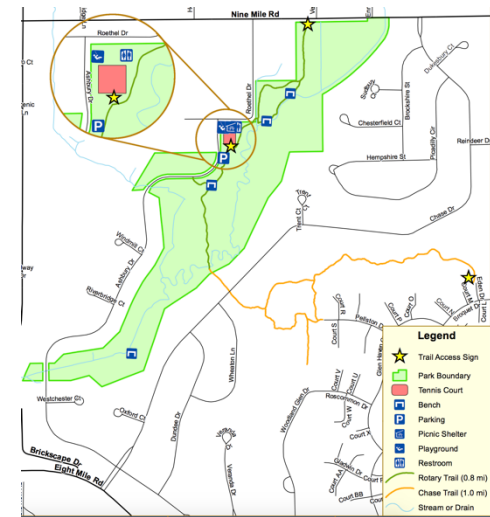


Figure 69. Novi's Rotary Park

12. Historical Markers of Interest

The Mapping and History sub-group of the Riverwalk Task Force, have identified seven major zones within The Riverwalk boundary that include historical people, structures districts, sites, buildings, objects, pathways, and landscapes. Using 15 different historical maps, the team has plotted and defined these items, both those here today as well as the ones that have passed out of existence. The intent of this study is to incorporate these “points” into the future Riverwalk, identified electronically and also to provide interpretive signage.

Historic sites will be mapped using GIS software. Clicking on a structure will provide a more in-depth description of the site, images, and a detailed history.



Figure 70.. Demonstration of GIS Mapping capabilities to provide detailed information on historical properties

13. Inventory and Assessment of Manmade Structures and Utility Crossings

Throughout the tributaries of the Middle Rouge River systems within the City of Northville, Northville Township and Novi, there are several man-made and natural impediments along the streambanks which include:

- a. discharge pipes that currently are not defined relative to their discharge source
- b. lack of scheduled maintenance from downed fallen trees
- c. illegal dumping along sections of the riverbanks

Some of these impediments are well known such as the active sanitary sewer shown in Figure 16 of Section F of this Framework plan. However, many others exist that are just as disruptive but need to be brought to the forefront for evaluation and corrective actions to improve our waterways.

Lack of maintenance along our water courses seems simple but this should be as much of a focus as man-made structures. Downed large trees and associated brush has a major impact on the development of erosion and unmanageable sediments.

Next Steps

The Task Force has prepared task lists associated with each of the Key Projects that will be implemented by the City of Northville. Additionally, cost estimates have been prepared with the projects prioritized.

The next section of the Framework Plan contains the Appendices.

Appendix I Lists Task Force Members, Stakeholders and River Stewards.

Appendix II Provides detail on the Site Conditions that were discovered during the Task Force's field work, investigation of public records and interviews with knowledgeable individuals.

Appendix III Provides detail on the Challenges that were identified and the Opportunities realized. This information was used to develop the Key Projects list.

Appendix I. Task Force Members, Stakeholders and River Stewards

River Restoration and Riverwalk Task Force Members

Michelle Aniol	Dave Gutman	Raymond Krahe	Tim O'Brien	John Roach	Dan Stedem
Rick Birdsall	Gary Jeffers	Jennifer Maude	Diane Pittaway	John Roby	Bill Stockhausen
John Carter	Nancy Jeffers	Barbara Moroski-Browne	Bill Phillips	Carol Schrauben	AnnaMaryLee Vollick
Jim Cracraft	Luci Klinkhamer	Mark Nickita	Nathan Reilly	Kathy Spillane	Don Webb

Nancy Darga, Chairman

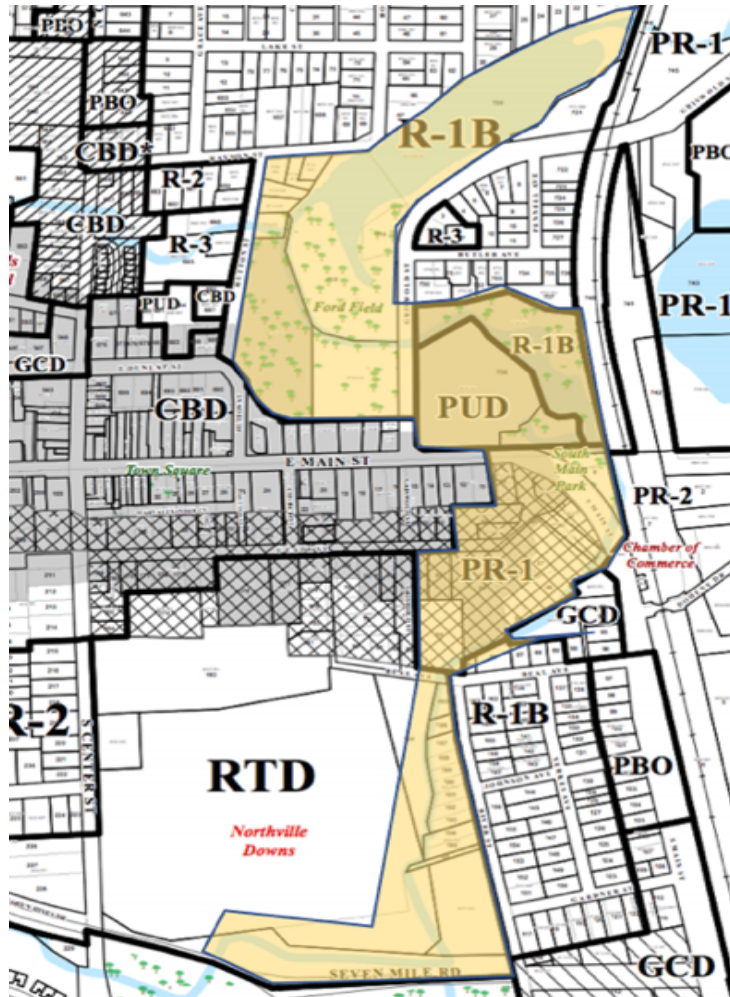
Stakeholders and River Stewards. Stakeholders are those who have an ownership interest in the properties. River Stewards are those organizations who have management responsibility for the river and the riparian corridor.

Stakeholders
City of Northville
Wayne County
Property Owners
Developers
Investors

River Stewards	
Alliance of Rouge Communities	Northville Historical Society
Friends of the Rouge	Northville Parks and Recreation
MI Department of Environment, Great Lakes & Energy (EGLE)	Michigan Department of Natural Resources – Fisheries Division
Wayne County	Wayne County Watershed Council

Appendix II: Site Conditions – Detailed Information

1. Zoning and Riparian Land Use



R – First Density Residential

PUD – Planned Unit Development

PR – Performance Indicated Industrial

RT – Racetrack



Declared Study
Area

Figure 71. Zoning

Zoning and land use is a sensitive issue for preferred developments along water edges. Land use surrounding the Upper Mill Pond is largely residential. Single family residential typically creates problems by destroying river edge plantings through mowing and use of fertilizers. They also tend to encroach upon public land and cut the public off from access. Industrial and commercial zoning along a riparian corridor should be discouraged. In most cases, it creates pollutants that enter the waterways and destroys most habitat.

South of the Upper Mill Pond, the land use has a large amount of green, open space, which is desirable. However, Industrial pollutants have migrated into the Lower Mill Pond from a facility east of the railroad tracks. The land use south of the Lower Mill Pond consists of former industrial structures as well as residential uses. The future land use for the Downs area is proposed green space. In addition to the projects listed in the Framework Plan, the River Task Force will need to look at required set-back and storm water discharge provisions in the City's ordinances.

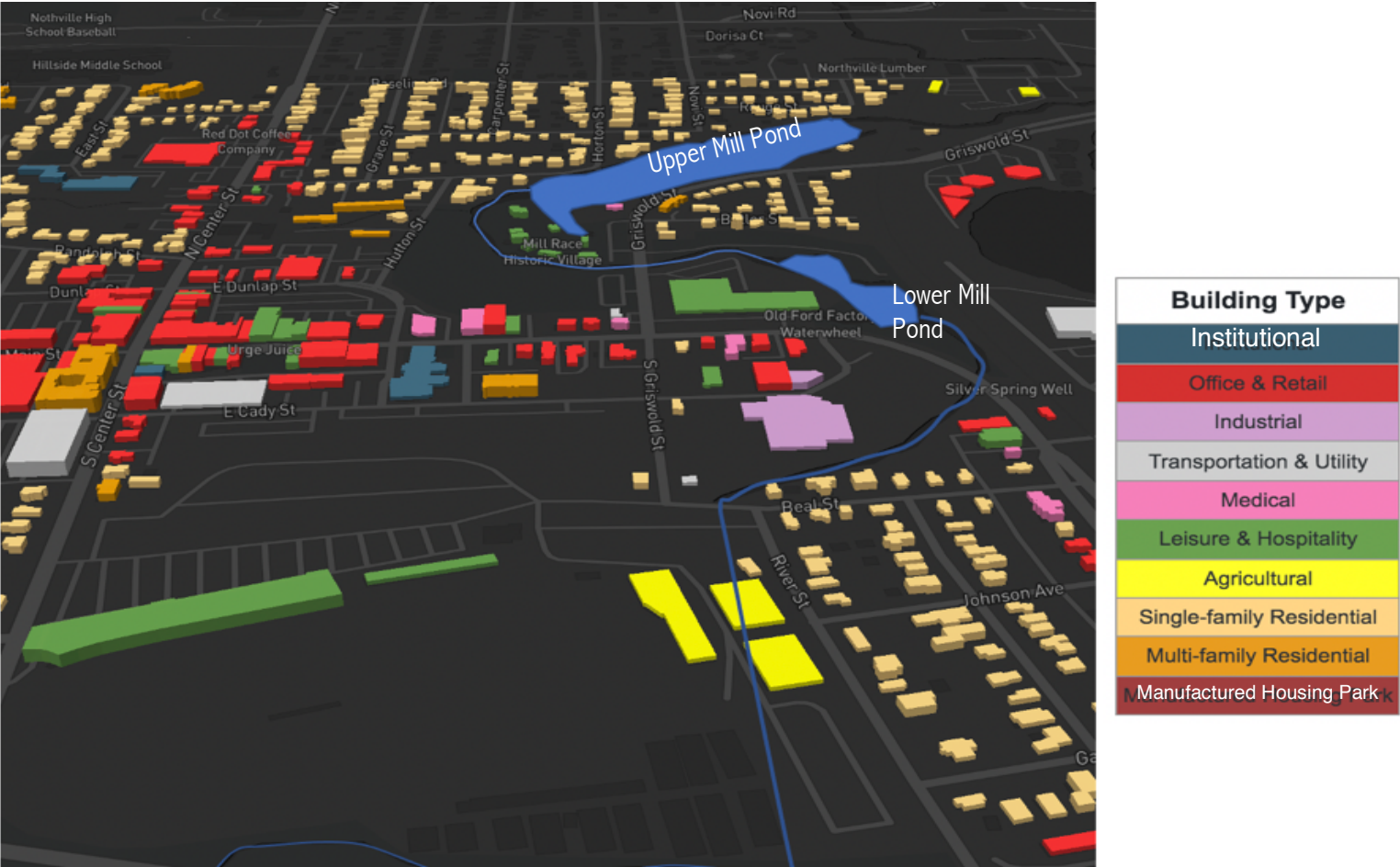
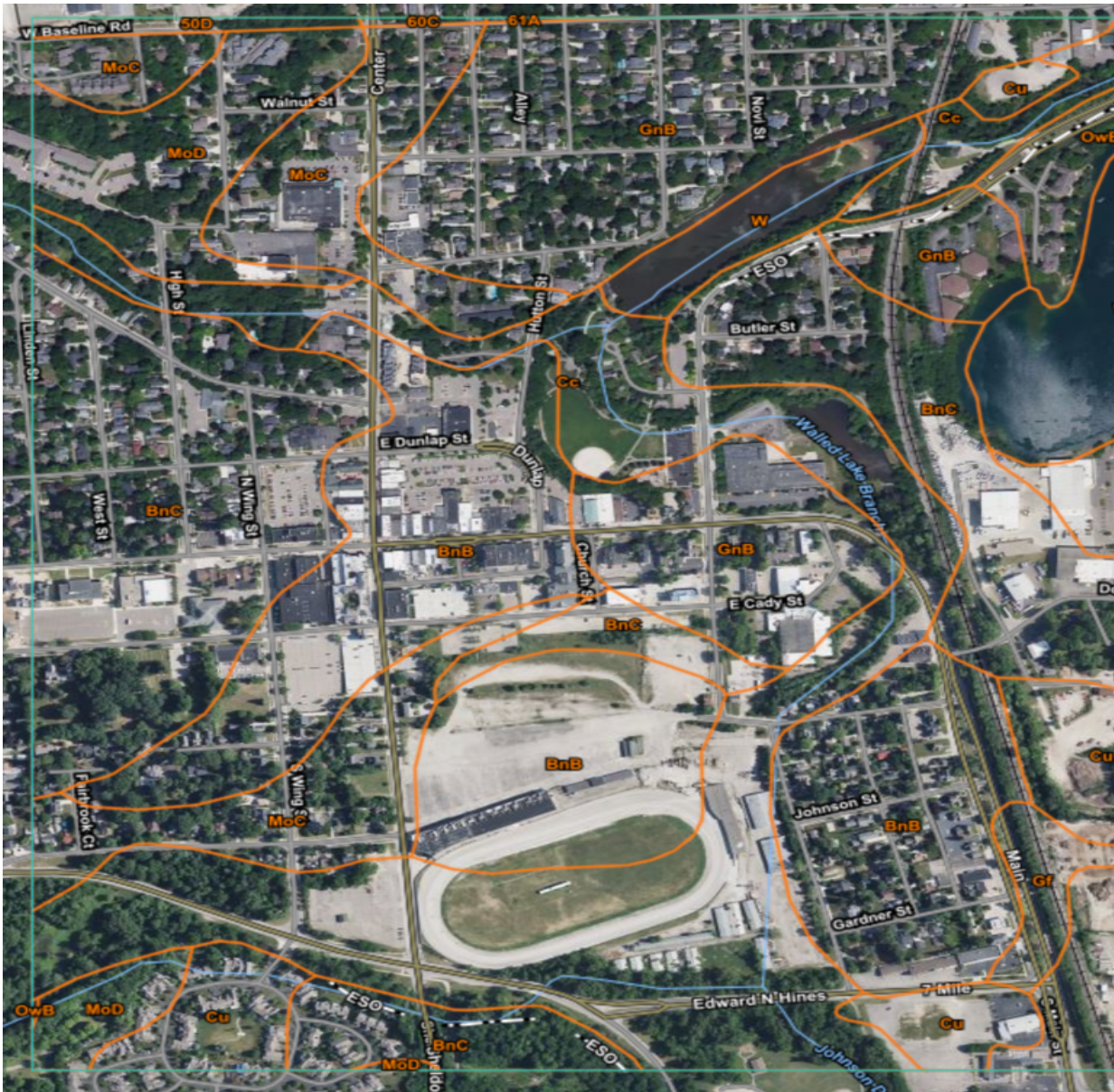


Figure 72. Land Use in Study Area

2. Soils



The survey indicates that the predominant soil type along the riparian corridor consists of Cc (Cohoctah fine sandy loam, frequently flooded). Over the course of history, however, the river's path has been redirected. Therefore, it is possible that adjacent soils, BnB (Boyer loamy sand, 0-6% slopes) BnC (Boyer loamy sand, 6-12% slopes) and GnB (Glynwood loam), could be present in the current-day riparian corridor.

Figure 73. Soils (Source: USDA Natural Resource Conservation Service Soil Survey)

Legend

- Cc (Cohoctah fine sandy loam, frequently flooded)
- BnB (Boyer loamy sand, 0-6% slopes)
- BnC (Boyer loamy sand, 6-12% slopes)
- GnB (Glynwood loam)

Table 2. General Site-Specific Soil Information

Site Location	Source of Information	No. of Borings	Soil Information
200 S. Main Bailey Shamoun & Stitching Post	BEA April 2018	6	Generally brown sand (loose to coarse) to a depth of 20'. Clay found in 1 boring (2.5-7'). Construction debris encountered in 4 of 6 borings.
455 & 459 Cady St.	BEA, August 6, 2013 Page 5	16	The lithology noted consisted of mixed sand and clay.
Park with pond behind Planet Fitness	BEA, August 13, 2004 for 175 Railroad St.	Approx. 150	The geology underlying the site consists predominantly of heterogeneous sand and gravel with occasional interbedded clay and silt.
Water Wheel Centre Building	Phase I Environmental Site Assessment		Generally consists of fill (sand, concrete, and brick), sand, and clay to 10.0 feet below ground surface (bgs), clayey sand to an undocumented depth, underlain by clay to at least 100.0 feet bgs, the maximum depth explored.
Northville Downs	McDowell & Associates Soil Investigation Report March 26, 2018	23	<p>Shallow to relatively deep fill soils consisting of asphalt pavement, surfacel topsoil, buried topsoil, gray crushed stone, slightly compact to extremely compact brown, discolored brown, dark brown and black fine sand to sand and gravel and soft to very stiff brown, discolored brown and blue silty clay to sandy clay. Fill soils also contained varying amounts of concrete, brick, wood, slag, topsoil, vegetation, cinders, peat and stones.</p> <p>Native soils composed of compact to extremely compact brown to gray silty fine sand to sand and gravel and stiff to extremely stiff brown to blue silty clay.</p> <p>Buried, organic marl was found in one of the borings, indicative of former river location.</p>
314-320 N. Center	BEA, Applied Environmental, Phase I Environmental Site Assessment, May 25, 2017, page 22.		<p>"The U.S. Department of Agriculture Soil Conservation Service mapped soils around the subject property as Wasepi-Gilford-Boyer association: Nearly level to sloping, very poorly drained, somewhat poorly drained and well drained soils that have a coarse textured or moderately coarse textured subsoil. According to previous subsurface investigations, soil at the subject property...was characterized as brown mixed clay and sand fill material with masonry debris from just below the surface to between 8 and 12 feet below the ground surface (bgs). This fill material was underlain by brown mottled grey, medium stiff to stiff silty clay to a depth of 16 feet bgs, the maximum depth explored. Soil encountered within/near a former excavation was characterized as brown fine grained sand fill from just below the ground surface to depths between 3.0 and 12.0 bgs. This fill material was underlain by a brown, mottled grey medium-stiff clay."</p>

3. Hydrology/Hydrogeology, Water Quality

a. Topography and Drainage

The City of Northville is located in the NW corner of Wayne County, with a small northern area of the City straddling the Oakland County boundary in SE Oakland County. The topography of the area is characterized as moderately undulating or “hilly” (Environmental Consulting and Technology (ECT), November 2018).

The topographic elevation where Randolph Creek enters the City in the NW corner is 920 ft NAVS88. The topography trends NW to SE, with elevations dropping 200 feet from a high of 960 ft NAVD88 in the NW corner of the City (Oakland Co.) to 760 ft NAVD88 in the SE corner of the Downs Property, where the Middle Rouge River exits the City. (Source: FOR, Rouge River Watershed Digital Terrain Map).

b. Geology/Hydrogeology

The City is located within the Michigan Basin regional structure: gently dipping Paleozoic and Mesozoic sedimentary rocks of Cambrian to Jurassic Age. The geology of the area is dominated by glacial deposits; aquifers consist of sand and gravel within a thick sequence of Pleistocene glacial deposits. These sandy areas, deposited by receding moraines, allow rapid infiltration of precipitation. Alluvium of 0-75 feet thickness comprises the uppermost aquifer material (in Wayne Co.) and consists of clay, silt, sand, and gravel. Where present, the alluvium is underlain by glacial deposits ranging from 20-400 feet in thickness (Mozola, 1969).

The Antrim Shale is the primary feature of the area’s bedrock geology. Two moraines exist in the NW corner of Wayne Co.: the Outer Defiance and Inner Defiance moraines. These NE to SE trending moraines are separated by an outwash deposit primarily consisting of sand and gravel. The moraines and till plains range in thickness from 180-400 feet and are primarily glacial till with isolated sand and gravel deposits. These areas of morainal deposits yield sandy areas that allow rapid infiltration of precipitation and movement of groundwater. These natural areas of high infiltration have low surface runoff potential and are ideal zones of groundwater recharge. The estimated transmissivity of glacial wells in Wayne Co is 56,330 sqft/day.

c. Groundwater Quality

The Outer Defiance and Inner Defiance moraines are separated by an outwash deposit consisting primarily of sand and gravel.

This gives the groundwater in the area its characteristic hard water quality, typical of glacial wells, with chloride and total dissolved solids (TDS) generally increasing with depth (Twenter, 1975; cited in ECT, November 2018).

Water Quality – Summary of ECT 2018 Report

The Rouge River was officially listed as an Area of Concern (AOC) in 1987 under the U.S–Canada Great Lakes Water Quality Agreement. Initially, it met nine of the 14 Beneficial Use Impairment (BUI) criteria. According to the Alliance of Rouge Communities (ARC), extensive progress has been made in Northville to reverse those impairments. However, three BUIs (Overall Watershed) are still applicable to the Study Areas and require infrastructure and habitat improvement projects to rectify.

- Beach closings
- Degradation of fish and wildlife populations
- Loss of fish and wildlife habitat

From 2014-2017, the 7-County Alliance of Rouge Communities (ARC) undertook a surface water quality monitoring program of the Rouge River watershed to assess water quality and habitat conditions. This determines progress toward meeting water quality standards, and to determine focus areas for implementation of stormwater best management practices. ARC's "2017 Rouge River Ecosystem Monitoring and Assessment Report" (ECT, November 2018) provides recent surface water quality data for bacteria, dissolved oxygen (DO), total suspended solids (TSS) and stream flow.

Bacteria

Escherichia coli (*E. coli*) is an intestinal bacterium associated with human and animal fecal matter. The State of Michigan uses this as an indicator of surface water quality.

E. coli was detected in the Walled Lake Branch upstream of Northville and did not decrease significantly over time throughout the study period. These samples were collected from an area of Novi known to have septic systems. It is possible that poorly sited or poorly maintained septic systems are not functioning optimally and are a source of *E. coli* in the surface water.

To identify source(s) of *E. coli*, ARC conducted an Illicit Discharge Evaluation Program (IDEP) in 2020. The IDEP included sampling and analysis in local area stormwater sewer outfalls, the results of which are summarized in a letter report dated January 29, 2021 (from Annette DeMaria to Karen Mendora, both of ARC).

Three locations affecting receiving waters of the Middle 1 sub watershed had high *E. coli* and human bacteroides:

- Outfall NV22 near Allen Drive & Novi Road discharges to the Walled Lake Branch. Source investigation is ongoing.
- NV03 discharges into Randolph Creek, a tributary of the Middle Rouge River. Investigation resulted in the identification of an illicit sewer connection that was corrected (ARC letter to City of Northville DPW, September 1, 2020)
- Outfall NV57 Creeks First Street and part of West Cady and discharges to Johnson Creek. Source investigation is ongoing.

Dissolved Oxygen (DO)

DO is a parameter where a higher concentration reflects better water quality to support the aquatic biota. The water quality target established in 2001 for DO is 5 mg/L and 7 mg/L for warm water and cold-water streams, respectively.

The results of the 2017 ARC sampling program indicated that the Middle 1 sub watershed has the highest DO concentrations of the Rouge River subwatersheds. The results of the 2017 surface water sampling program included:

- Mean DO in Northville of 8.9 mg/L;
- All DO results for Johnson Creek met minimum WQS for DO applied to coldwater streams;
- Johnson Creek WQS for DO were met 98%-100 of the time
- DO concentrations in Johnson Creek were steady since 2011.

Total Suspended Solids

Mean TSS concentrations during wet weather events compiled in 2017 were compared to those reported in 2006. The mean values for the Middle Branch of 34 mg/L (wet) and 15 mg/L (dry) placed the Middle Branch in the “good to moderate” category. This represented a 64% decline from wet weather values in the 1994-2001 period. TSS is 80 mg/L.



A key outcome of the ARC study is that the TSS, DO and flow data suggest that a more natural hydrologic system has been obtained in the Middle 1 sub watershed. With TSS at acceptable levels, the BUIs noted in the state's Biota TMDL are not caused by TSS.

The ARC report concluded that remaining impairments are likely due to:

- Lack of appropriate substrate.
- Flashy stream flows.
- Lack of connectivity.
- Poor riparian zone management.

ARC further notes that with improved stormwater management using green infrastructure, flashiness will decrease, and base flows will increase, providing more stable habitat for aquatic species.

The following measures were recommended by ARC to improve surface water quality to better support aquatic biota:

- Improve stormwater management to decrease flashy flows, increase base flow and improve stream temperatures.
- Address connectivity for better fish passage.
- Establish riparian management ordinances.
- Address E. coli pollution sources.

Water Control Devices, Outfalls and Discharges

a. Water Control Devices

The Upper Mill Pond spillway is located on the north side of Mill Race Village. Figure 74. shows the pond and the location of the spillway, which was renovated in 2014. Also shown is the location of a waterwheel headrace, which consists of an auxiliary channel that connects to an underground penstock. The waterwheel is located on the opposite side of Griswold and is situated on the east side of what is now known as the Water Wheel Centre building. The tail race of the stream is located at the base of the water wheel and rejoins the Walled Lake Branch below the Lower Mill Pond spillway. Figures 74 and 75 shows the general configuration of these systems. It is worth mentioning the penstock does not function as a flood control device.



Figure 74 Mill Race Pond Spillway



Figure 75 Schematic showing the location of the penstock



Figure 76. Lower Mill Pond Spillway



Figure 77. Historic Water Wheel Centre Building

- a. **Outfalls and Discharges** Figure 78 shows the locations of stormwater outfalls in the City of Northville. Of the 59 identified, 13 are located in the Declared Study Area. Photos of some of these outfalls are contained in Appendix III Section 2.



Figure 78. Stormwater Outfalls in Northville.

5. Sediment

The Mill Pond north of Mill Race Village has an extensive amount of sediment, which is visible from above as shown below in Figure 80. The sediment enters the pond from the river, which flows east to west. As shown below, the silt has formed an island.

In 1997, a Preliminary Proposal for the Upper Mill Pond was prepared by Johnson, Johnson and Roy (JJR) in response to the City's concerns that the pond was slowly stagnating with accumulated sedimentation over many years, leading to excessive algae and aquatic plant growth, odor problems and reduced aesthetic appeal. JJR prepared several alternative proposals. The proposals suggested redistributing sediment rather than hauling it off site. A review of correspondence, suggested that residents were still not satisfied with the proposed paths and public access areas.



Figure 80. Upper Mill Pond sediment exceeds pond depth

The Lower Mill Pond is approximately 2-3 feet deep. Section F3 "Contaminated Soils" outlines the extent of oil contamination from a former industrial property located east of the railroad tracks. A catchment system was installed east of the pond. Land use restrictions are in place due to contamination. If dredging is done, PCB's are likely to be found in the sediment.



Figure 81. Lower Mill Pond at East Ford Field

6. Native Species and Aquatic Wildlife

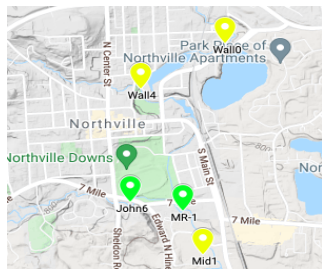
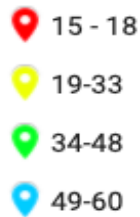


Figure 82. Benthic Macroinvertebrate Counts



Bugs – Benthic Macro-Invertebrates

The Friends of the Rouge Water Monitoring program trains citizens to collect data about the health of the watershed through biological indicator species (bugs, frogs, fish, etc.) These indicators reflect the long-term health of the watershed. As water quality improves, bugs frogs and fish are returning. Benthic (meaning “bottom-dwelling”) macroinvertebrates are small aquatic animals and the aquatic larval stages of insects. They include dragonfly and stonefly larvae, snails, worms, and beetles. The Walled Lake branch upstream at Rotary Park is not as healthy and has a fair stream quality index score.

Species and Year Detected
<p><u>Frogs and Toads</u></p> <p>In 2021, seven species have been identified in the Study Area out of eight possible, indicating good wetland diversity. Tables 3 and 4 provide a snapshot of frog species identified over a period of 18 years.</p>

Table 3 Northville Downs Block	
American Toad	
Bullfrog	
Chorus Frog	
Gray Treefrog	1998
Green Frog	
Leopard Frog	
Spring Peeper	1998
Wood Frog	

Table 4 Upstream of Northville Downs	
American Toad	2004, 2011, 2016
Bullfrog	2016
Chorus Frog	1998, 2016
Gray Treefrog	2004, 2016
Green Frog	2011, 2016
Leopard Frog	2016
Spring Peeper	1998, 2004, 2016

FISH: The Johnson Creek upstream of Northville Downs had 12 species when sampled in 2021 including sensitive species like rainbow darter, mottled sculpin and brown trout. Upstream, the Walled Lake branch at Rotary Park had 13 species but most were tolerant of the river environment. (Source: Friends of the Rouge Biological Data for Northville Downs Area 2021).

Table 5. Electrofishing survey results at Fish Hatchery Park in Northville prior to restoration. The survey yielded 70 individuals from 12 species. (Source: Environmental Consulting & Technology).

Common Name	No.	Percent	Common Name	No.	Percent	Common Name	No.	Percent
Bluegill	6	9%	Green Sunfish	5	7%	Common Shiner	1	1%
Bluntnose Minnow	1	1%	Largemouth Bass	1	1%	Pumpkinseed	1	1%
Brown Trout	3	4%	Mottled Sculpin	16	23%	Creek Chub	14	20%
Green Sunfish	5	7%	White Sucker	11	16%	Western Blacknose Dace	2	3%

7. Precipitation Data

A review of existing precipitation data for the Detroit area revealed that overall averages as measured in 10-year increments are increasing.

Table 6a. Monthly and Annual Precipitation for Detroit Area (1960-1979 source National Oceanic Weather Service)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Total	Decade Avg.
1960	3.1	2.29	1.13	2.06	2.87	6.58	1.4	2.5	0.78	2.17	1.35	0.44	26.67	30.457
1961	0.2	2.2	2.68	5.23	2.54	2.74	3	5.12	5.55	1.49	2.96	1.29	35.02	
1962	2.4	2.55	1.14	2.26	1.26	4.93	2.6	3.56	2.99	1.76	1.3	1.02	27.26	
1963	0.6	0.7	2.47	2.25	2.28	3.1	2.9	1.71	1.28	0.51	1.27	1.37	20.49	
1964	2.3	0.52	2.62	4.65	1.68	2.35	2.4	5.87	2.12	0.5	0.81	2.19	27.94	
1965	3.7	2.49	3.02	3.04	2.16	2.11	3	3.24	4.15	2.88	1.2	3.93	34.95	
1966	0.7	1.38	2.21	2.65	2.18	4.16	5.2	5.03	1.51	1.15	3.13	4.53	33.85	
1967	2.3	1.28	1.03	3.67	1.63	4.23	2.9	2.01	1.96	4.87	2.77	5.19	33.83	
1968	2.3	1.48	2.04	1.71	5.88	4.99	5.1	1.83	1.87	1.09	3.31	3.59	35.23	
1969	2.8	0.15	1.62	3.77	3.74	4.26	6	1.06	0.68	1.41	2.46	1.33	29.33	
1970	1.1	0.86	2.62	3.32	3.01	3.9	3.3	2.75	1.63	1.91	2.73	1.61	28.75	30.642
1971	1	2.68	1.59	0.92	1.97	2.17	2	1.62	2.72	1.01	1.34	3.79	22.79	
1972	1.3	1	2.55	3.63	2.68	3.3	2.2	3.07	3.4	2.24	3.19	3.11	31.66	
1973	1.7	1.08	4.48	1.42	3.72	4.86	4.7	1.67	1.82	2.01	3.21	3.51	34.09	
1974	3.3	2.37	4.2	2.75	3.49	2.38	0.6	2.95	2.22	0.81	2.86	4	31.88	
1975	2.9	2.65	1.66	2.5	2.82	2.39	2	7.83	3.18	1.29	2.39	3	34.59	
1976	1.9	2.87	4.24	3.15	3.26	3.26	1.5	1.68	3.66	2.01	0.79	0.79	29.09	
1977	1	1.64	3.57	4.17	2.4	3.16	3.3	2.23	4.23	1.37	2.88	2.97	32.88	
1978	3.2	0.45	2.05	2.49	3.58	2.69	2	1.73	1.82	2.49	2.41	2.81	27.65	
1979	1.5	0.57	2.44	4.97	2.82	4.04	5	2.99	0.94	1.24	4.19	2.36	33.04	

Table 6b. Monthly and Annual Precipitation for Detroit Area 1980-1999 (source National Oceanic Weather Service)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Total	Decade Avg.
1980	0.7	1	3.88	4.23	3.22	6.42	4.3	6.09	2.94	1.26	0.88	2.3	37.24	34.102
1981	0.6	3.13	0.82	3.44	2.6	3.33	4.3	2.32	5.47	3.92	1.26	2.38	33.53	
1982	3.4	1.1	3.14	1.6	2.83	4.11	4.8	0.72	2.55	1.01	5.68	3.29	34.24	
1983	0.8	0.89	1.87	4.2	5.47	4.88	4.5	1.57	2.49	2.85	4.28	3.78	37.65	
1984	0.8	1.31	3.12	2.48	3.62	1.04	1	3	2.3	2.28	2.49	2.9	26.27	
1985	2.6	3.83	4.42	2.11	3.11	1.62	4	4.88	2.59	3.91	5.51	1.51	40.08	
1986	1.3	3.46	2.29	2.73	1.36	5.75	2.5	3.52	7.52	3.05	1.88	2.28	37.61	
1987	2.4	0.53	2.19	2.14	2.5	7.04	2.2	6.87	2.69	2	3.17	4.6	38.28	
1988	1.3	2.02	1.16	1.5	0.87	0.97	2.4	3.13	3.65	3.57	4.29	1.97	26.86	
1989	1.3	0.77	2.16	2.22	4.16	3.79	4.2	2.14	3.03	1.73	2.53	1.24	29.26	
1990	1.8	5.02	1.91	2.72	3.74	4.92	1.5	3.85	6.06	4.14	2.64	4.37	42.64	32.865
1991	1.4	0.94	1.41	2.66	6.2	1.89	1.2	4.31	0.9	4.14	2.61	1.91	29.64	
1992	1.8	1.54	3.34	4.34	1.33	2.35	5.9	2.5	5.55	2.01	4.33	2.35	37.33	
1993	3.9	1.27	2.12	3.32	1.24	6.05	2.2	1.6	4.26	2.21	1.69	0.78	30.63	
1994	2.8	1.38	2.29	4.04	1.18	3.97	3.2	3.3	2.38	1.35	2.74	2.39	31.01	
1995	2.5	0.89	1.73	3.44	3.55	1.55	3.4	3.71	0.62	3.53	3.08	0.85	28.82	
1996	1.9	1.76	1.56	3.39	2.82	2.37	2.6	0.43	4.42	1.59	1.99	2.57	27.39	
1997	2.4	4.04	3.46	1.56	5.23	3.17	2.6	3.22	3.49	1.97	0.95	1.89	34.04	
1998	2.8	3.6	4.08	3.96	2.55	2.69	5.7	4.19	1.5	1.34	1.36	1.16	34.93	
1999	3	1.98	1.12	5.13	2.2	5.46	3.6	1.31	3.11	1.56	1.49	2.24	32.22	

Table 6c. Monthly and Annual Precipitation for Detroit Area 2000-2019 (source National Oceanic Weather Service)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Total	Decade Avg.
2000	1.3	0.84	1.55	4.35	5.11	4.9	5.4	4.63	6.71	3.05	1.69	2.63	42.15	34.039
2001	0.7	2.88	0.93	3.2	3.7	3.4	1.2	2.87	4.28	6.76	2.35	2.23	34.45	
2002	3.4	1.91	2.12	4.48	3.76	1.07	3.5	3.32	1.95	1.15	2.72	1.16	30.5	
2003	0.4	0.66	1.46	2.07	4.73	2.5	2.6	4.36	4.27	2.74	2.97	2.65	31.42	
2004	1.4	0.63	3.29	0.69	8.46	2.86	2.9	4.51	0.65	2.08	3.21	2.91	33.57	
2005	3.4	3.02	0.74	1.66	1.85	1.95	5.4	1.32	1.63	0.13	4.7	2.52	28.3	
2006	3.2	2.71	3.21	2.71	4.6	3.95	4.4	2.05	1.73	4.11	2.9	3.65	39.24	
2007	3	0.82	3.09	2.68	2.56	3.1	2.1	6.61	1.44	2	1.77	3.48	32.67	
2008	2.1	3.61	3.17	0.96	2.03	4.05	3.2	0.27	5.99	1.15	3.31	4.07	33.98	
2009	1.1	2.12	4.17	5.03	2.89	5.27	2.6	2.76	1.46	3.23	0.62	2.9	34.11	
2010	0.8	1.9	1.07	2.26	5.31	5.42	6	0.59	3.32	1.07	3.34	1.28	32.28	36.527
2011	1.5	3.6	3.61	5.61	5.38	0.94	7.7	2.16	6.28	2.14	6	2.79	47.7	
2012	3	1.91	2.95	2.15	1.72	1.31	3.7	2.25	2.47	2.32	0.72	2.64	27.11	
2013	3.5	2.83	0.74	5.29	2.54	6.01	4.1	5.98	1.2	3.48	1.82	2.42	39.9	
2014	2.9	2.82	1.49	2.57	4.87	4	2.4	6.32	4.71	2.36	1.67	1.41	37.57	
2015	1.5	1.35	0.8	2.61	5.53	5.32	1.8	3.16	1.29	1.97	2.06	3.01	30.31	
2016	1.3	2.02	4.86	2.31	2.2	1.3	1.6	5.62	6.28	2.98	2.1	2.16	34.74	
2017	2.8	1.9	4.26	3.55	4.39	2.02	2.4	3.91	0.91	2.84	4.93	1.48	35.46	
2018	1.4	4.27	2.63	3.79	6.35	3.66	4.2	1.2	6.46	3.56	3.63	2.66	43.81	
2019	1.9	2.22	2.46	5.82	3.61	2.86	2.6	3.14	3.44	4.41	1.65	2.29	36.39	

Table 6d. Monthly and Annual Precipitation for Detroit Area 2000-2021 (source National Oceanic Weather Service)

2020	4.1	1.16	3.86	2.21	3.62	2.4	5	5.99	3.95	2.41	2.63	1.36	38.73
2021	1	1.47	2.13	1.79	2.23	5.16	5	5.17	5.43	5.25	1.91	3.47	39.99

Appendix III. : Challenges – Detailed Information

1. Access



Ford Field West

The entrance to Ford Field West from Hutton consists of a set of stairs that descend more than 20 feet to the park. The slopes in this area are steep, with stability challenges. The condition of these stairs is poor. In addition, this point does not meet barrier-free standards.

Figure 83. Entrance to Ford Field from Hutton



Figure 84. Deterioration of Access Stairs

2. Erosion and Slope Stability

a. Erosion Within the Banks of the Waterways



Figure 85. Erosion sites at Ford Field West, Mill Race Village and Ford Field East (see Section d Photo Gallery for larger images)

Several locations along the Rouge River within the Study Area have experienced erosion resulting in sediment transfer downstream. Most of these areas are along the Walled Lake Branch between Ford Field and Mill Race Village. Many factors contribute to this. What is obvious is the lack of appropriate riparian vegetation, man-made obstructions impacting river flow and lack of proper maintenance. Other factors that need to be considered include the following:

- 1) During larger storm events the velocity of the water in this area is high due to:
 - a) the narrow width of this waterway and
 - b) the gradient (slope) from Upper Mill Pond to the culvert under Griswold St. During heavy storm events, water backs up west of the bridge culvert at Griswold and saturates/erodes more of the waterway bank area. The waterways east and south of Griswold are much wider and do not have the same velocity and volume issues. This area of the pond is shown in Figure 86. (next page)

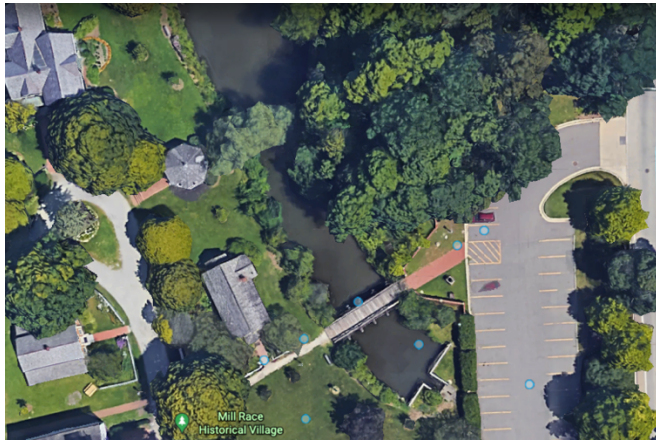


Figure 86. Aerial photo showing channel and bridge culvert

- 2) The Upper Mill Pond's waters flow over the existing spillway/dam at the south end of the Pond. As water rises in the pond from heavy storm events and upstream tributaries, more water is pushed over the spillway at a higher velocity. This pond contributes additional sediment as evidenced by the aerial photos in Appendix II Section 5.



Figure 88. Baseline flow. View from Beal Street parking lot looking north. Foundry Flask property on opposite side of bank.



Figure 87. Upper Mill Pond spillway

- 3) Flashy Flows: Development of communities upstream of Northville has created more runoff as the quantity of impervious surfaces has increased. This causes more water to move at higher velocities through stream channels. The Rouge River is often referred to as flashy due to these flows. This frequently results in both streambank and streambed erosion. This can cause widening and deepening of the channel, reducing the quality of the stream substrate, and deteriorating habitat.



Figure 89. View from same Figure 88 location showing flashy flows after heavy precipitation

b. Slope Stability

Several walls on the opposite bank of Foundry Flask are in great distress. Due to erosion, all the walls have been undermined and are in danger of collapse. Any wall that collapses will likely include movement of the soil they were supporting and damage to any adjacent paving or structures.

The existing concrete walls will likely need to be replaced. Every effort should be made to salvage the existing cobblestone walls to maintain their historic nature. Restoring proper support is paramount to any of the walls that can be salvaged. Engineering studies should be initiated immediately.

Note: All retaining wall photos are along the South Bank of the Walled Lake Branch tributary, south of Foundry Flask between Northville Road and Beal Street.



Figure 90. Deteriorated concrete wall undermined by erosion. Active sanitary supported after being undermined.



Figure 91. Historic stone wall undermined due to erosion



Figure 92 . Historic stone wall undermined and in poor condition.

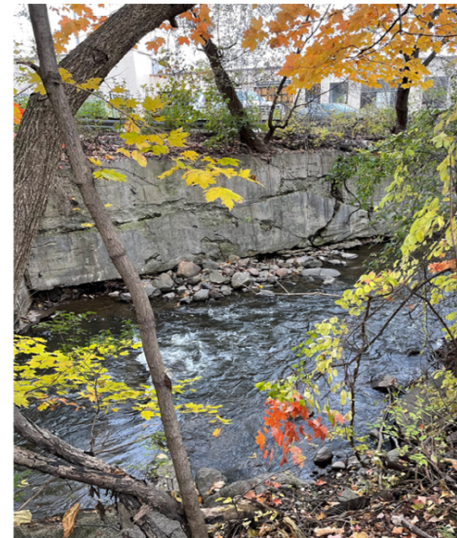


Figure 93. Undermined concrete wall and in very poor condition

A section of Mill Race Village (Mill Race) has been unstable for years, contributing sediment into the Walled Lake Branch. This section is located immediately north of the foot bridge to Ford Field. Other areas along the south side of Mill Race are unstable and allow sediment to enter the Walled Lake Branch.



Figure 95 Mill Race Village path and sediment erosion

The west and south banks of Ford Field also need to be evaluated from a slope stability standpoint to ensure safe walkways associated with the Riverwalk experience. Figure 96 below shows a leaning power pole located within the west bank of Ford Field. It is believed that much of the embankment west and south of Ford Field contains construction debris (broken concrete, brick, glass) and other deleterious materials (topsoil, uncompacted soil) that is not suitable as a stable embankment.

Of note: During a 1988 Oral History Interview with Don Litsenberger, lifetime Northville resident (1913-2002), he remarked: "There on Hutton Street at the end of Dunlap, why for years that was a dump. Everybody took their trash down there (Interviewer: Where Ford Field is now?) That's right. They took their rubbish down to the end of Dunlap Street and dumped it over the bank".

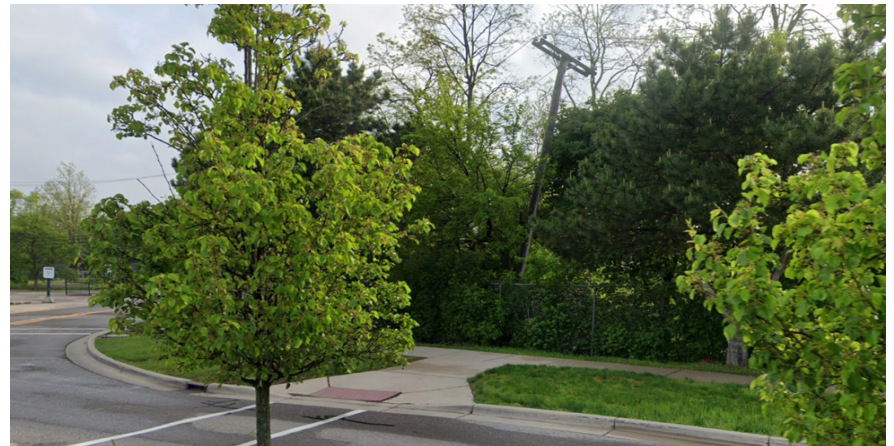


Figure 96. East side of Hutton Street at top of Ford Field West slopes.

c. Riparian Vegetation

The use of riparian vegetation throughout the entire Study Area will be a critical tool to minimize sediment discharge into the Rouge River waterways. Proper planning and design of this vegetation is critical to the overall success of erosion control and slope stabilization.

The Environmental Protection Agency defines buffer areas as, “areas of planted or preserved vegetation between developed land and surface water, [which] are effective at reducing sediment and nutrient loads.” These areas are critical to the biological, chemical, and physical integrity of our waterways. Riparian buffer areas protect water quality by cooling water, stabilizing banks, mitigating flow rates, and providing for pollution and sediment removal by filtering overland sheet runoff before it enters the water.

In general, riparian buffers should be between 35 to 100 feet in width. Buffers less than 35 feet generally do not protect aquatic resources in the long term. (Source: SEMCOG Low Impact Development Manual, 2008). A large portion of the riverbanks in Ford Field East and West are planted with grass and frequently mowed, with limited riparian plantings. This increases the erosion impacts of surface runoff.

Key initiatives to aid in improving the Declared Study Area waterways and the overall Framework Plan

- I. Identify areas of erosion along the waterways. Engage consultants to evaluate/design erosion control and slope stabilization measures based on each condition. This is a large undertaking but critical to improvements to the environment/habitat. Riparian vegetation species, boulders, riprap and temporary erosion blankets will be some of the key tools.
- II. Initiate design plans to stabilize non-riverbank areas (for example, parking lots) to minimize discharge of sediment and harmful chemicals into the waterways.
- III. Evaluate options available to lessen the impact of the spillway at the south end of the Upper Mill Pond
- IV. Upper Mill Pond should be evaluated to lessen the impact of sediment and water to the Study Area. Dredging has been discussed previously.
- V. Investigate and evaluate the stability of the embankments bordering Ford Field
- VI. Evaluate ways to lessen the amount of water flow south of the Study Area while enhancing the Riverwalk initiative.



Figure 97. Workers installing riparian plantings on streambanks.

d. Erosion: Photo Gallery



Figure 98 Erosion at pipe intrusion Walled Lake Branch



Figure 99. Erosion due to debris Walled Lake Branch

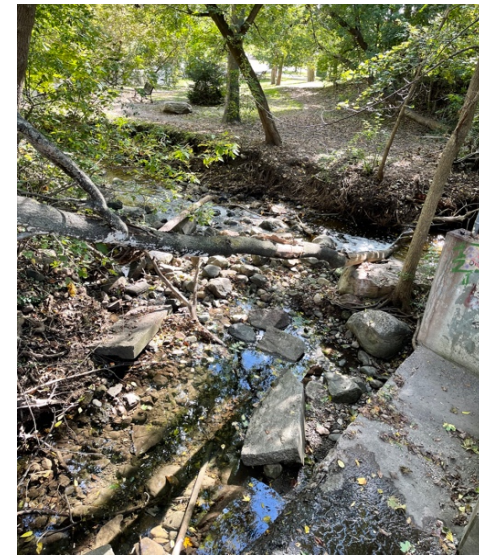


Figure 100 Erosion from discharge pipe at Serenity Point



Figure 101. Erosion due to large pipe discharge Walled Lake Branch



Figure 102. Erosion due to flashy flows at Walled Lake Branch



Figure 103. Erosion Walled Lake Branch



Figure 104. Johnson Creek Erosion (1)



Figure 105. Johnson Creek Erosion (2)



Figure 106. Northville Road looking northeast

3. Invasive Species

Invasive Species are: “Species that are non-native to the ecosystem under consideration, and whose introduction causes or is likely to cause economic or environmental harm or harm to human health” (National Invasive Species Council, 1999).

The Michigan Wildlife Action Plan has identified invasive species as one of two highest priority threats to wildlife in both aquatic and terrestrial systems.

Approximately 96 % of all terrestrial birds feed their young on insects, insect larvae and spiders and their relatives (which eat insects in turn). Recent studies suggest that the reduced availability of insect prey in habitat dominated by invasive plant species has a measurable effect on bird reproductive success. (Source: Invasives Strategy, Michigan.gov)

Among their many impacts, invasive species may:

- Displace more valuable resources for wildlife.
- Not support critical components of the food chain, particularly invertebrates.
- Be unpalatable or toxic to wildlife.
- Disrupt mutualistic relationships between mycorrhizae and their plant hosts, which promote forest regeneration.
- Diminish the amount and quality of recreational opportunities, including hunting, hiking, birdwatching, etc .

All four of the invasive species shown in Figure's 107-110 can be found in Ford Field East. Buckthorn is also widely present in many of the Declared Study Area parcels. Streambank conditions will need to be further analyzed to determine whether these plants are largely responsible for stabilizing slopes particularly at Johnson Creek.



Figure 107. Honeysuckle



Figure 108. Common Buckthorn



Figure 109. Phragmite

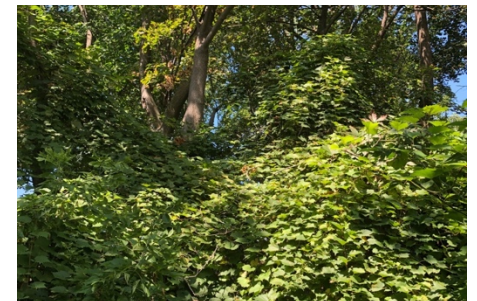


Figure 110. Invasive Grape Vine

4. Endangered Habitat

For many varieties of animals and plants, rivers are important habitats. Birds, fish, invertebrates, amphibians, turtles, and insects live in or find their food there. Rivers are instrumental in connecting habitats between upstream and downstream areas, and by connecting both sides of riverbanks. Natural habitats within Northville are, in some cases, continuations of much larger landscapes that exist outside the City limits within the Wayne County regional park system. Aquatic biodiversity can only thrive in irregularly shaped river channels, where fish and amphibians can hide from predators. See Bibliography Source No. 1. The river channel that runs beneath the Downs property currently severs the desired connectivity between Northville and regional habitats, and its straight shape does not accommodate a habitat where fish can thrive.

Many species travel throughout various stream locations to reproduce. Spawning migrations occur since the environmental conditions of feeding habitats do not necessarily equate with ideal incubation and rearing habitat conditions. This spawning behavior can move in either direction. For example, carp, perch and pike migrate towards backwaters or seasonally flooded vegetation. Whereas, other species, such as grayling or trout, migrate towards tributaries. Water quality experienced during maturation and spawning migrations, availability of spawning habitat and quality of connections (distance, presence of obstacles, etc.) between spawning and feeding habitats represent important environmental components for the maintenance of fish populations. See Bibliography Source No 2.

Dams and spillways can block or impede migration and can create deep pools of water that in some cases inundate important spawning habitat or block access to it. Dams also change the character of rivers, creating slow-moving, warm water pools that are ideal for predators. See Bibliography Source No. 3. Northville has two spillways, which are described in Section 4 “Water Control Devices”.

Habitat is also facilitated through water temperature. Many species prefer cooler temperatures. Currently, Johnson Creek is the only cold-water creek in the Rouge River Watershed. Water temperature is affected positively by the cooling effects of tree cover. Except for the Downs property, Ford Field East and riparian zones along S. Main St., most of the Study Area has sufficient tree canopy cover to provide cooling results.

Trees also support the lives of a variety of wildlife species which are present in Northville, such as birds, squirrels and bats. Trees can serve as places from which to hunt prey. They are also used for food, shelter and nesting.



5. Contaminated Sites

Most parcels within the Declared Study Area have experienced heavy to light industrial use over time and may impact the Riverwalk project in various ways, such as:

- Direct impact of the waterways via free phase (non-aqueous phase liquid, NAPL) or dissolved contaminants at the groundwater-surface water interface.
- Indirect impact via surface water runoff of contaminated surface soil, pavement, construction dust and debris, etc.
- Erosion of riparian zone soils impacted by free phase, soil and groundwater contamination from sites located adjacent to the waterways.
- Future exposure of currently contained contamination (e.g., contaminated soil under pavement) from earth-moving activities during future renovations or developments must be mitigated via compliance with soil erosion and sedimentation control plans.
- Human health exposure of workers during future renovations or developments at contaminated sites.

Figure 111 shows sites in the Declared Study Area obtained from EGLE's Environmental Mapper. A review of Baseline Risk Assessments was conducted, but these were dated or incomplete. It is recommended that current sampling results are obtained for each site. While sites adjacent to the waterways within the Declared Study Area are the primary focus of this report, it is important to note that contaminants can migrate long distances from non-adjacent sites and discharge to the waterways at the groundwater-surface water interface.

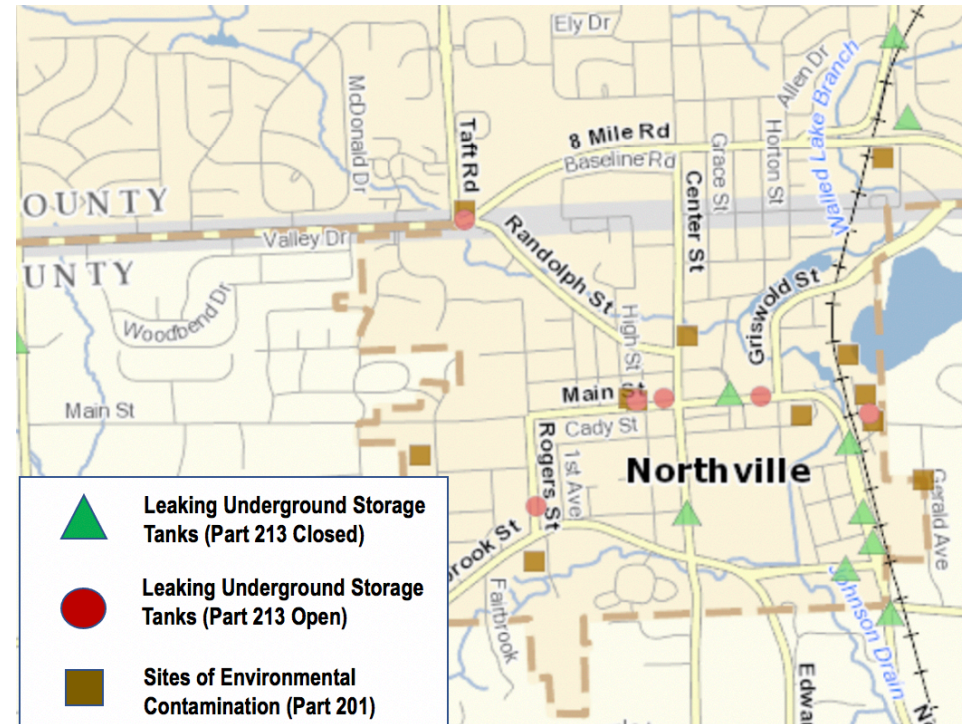


Figure 111: Part 201 & Part 213 Sites In Declared Study Area.

The Michigan Department of Environment, Great Lakes and Energy (EGLE) regulates potentially or known contaminated sites in accordance with the Natural Resources and Environmental Protection Act (P.A. 451 of 1994). Act 451 provides for the identification, evaluation, risk assessment and remediation of contaminated sites through numerous parts in accordance with the nature of potential contamination source. There are several classifications for sites of known or potential contamination. Part 201 and Part 213 are the two most relevant.

- Part 201 sites have known contamination with the potential to enter a river through surface water runoff or groundwater contamination, and adversely affect the environment, aquatic resources, or present public health hazards. Part 201 sites recorded by EGLE within the Declared Study Area are shown in Figure 111.
- Part 213 sites have Leaky Underground Storage Tank (LUST), which present similar potential adverse effects as described above due to the regulation of USTs (under Part 211) and the more rapid ability to respond. Part 213 sites located within the Declared Study Area are shown on Figure 111.
- Part 211: In addition to Part 201 and Part 213, Act 451 includes provisions to regulate underground storage tanks due to their potential to leak. Part 211 sites are presumed to contain sound USTs but are regulated to enable rapid response in the event of a release. As of December 5, 2021, 5 active and 18 closed Part 211 sites were recorded in the Declared Study Area.

Land Use Restrictions (LUR) are Institutional Controls that enable site closure by demonstrating risk-based mitigation of exposure concerns. There are numerous types of LURs. LURs identified in the City included 5 Restrictive Covenants (RC); 2 Notice of Corrective Actions (NCA), and 1 “Other” Institutional Control (IC). LURs identified within the Designated Study Area are summarized in Table 7.

The State of Michigan has been proactive in the implementation, monitoring and remediation of per- and polyfluoroalkyl substances (PFAS). The Michigan PFAS Action Response Team (MPART) released data for its PFAS surface water sampling program. The data includes two sample locations in Novi immediately upstream of the City (Ingersol Creek in Rotary Park and from the Walled Lake Branch), 3 locations along the Johnson Creek, and 3 tributaries to the Johnson Creek.

The data for PFOA and PFOS was compared to Michigan Part 4 Rule 57 Water Quality Values (WQV non-drinking water). Concentrations of PFOA and PFOS met non-drinking surface water criteria in all but one sample. A sample from the location “unnamed tributary to an unnamed tributary to Johnson Creek” had 16.5 ppt PFOS compared to an allowable WQV of 12 ppt. All samples collected from Johnson Creek downstream from this location had very low PFOS and PFOA concentrations (i.e., less than the method detection limit or less than the laboratory reporting limit).

Table 7. Part 201 and Part 213 Institutional Controls Registered Within the Designated Study Area (current as of December 5, 2021)

Address	DEQ Reference #	Control Type	Land Use Restriction	Notes
710 W 8 Mile Rd	RC-RRD-213-09-150	Restrictive Covenant	Industrial/Commercial only	
710 W 8 Mile Rd	RC-RRD-213-16-013	Restrictive Covenant	Nonresidential only	Residual LNAPL
175 Railroad St	IC-RRD-201-17-005	"Other" IC		
Ford Field East Park	RC-RRD-201-15-046	Restrictive Covenant	Open Space Public Park only	Remedial Action Plan, August 2014
CSX Railroad ROW	RC-RRD-201-15-047	Restrictive Covenant	Nonresidential only	Refer to Remedial Action Plan, August 2014
650 Doheny Dr	NCA-RRD-213-04-178	Notice of Corrective Action		No CA needed; Tier 1 met
301 S Center St	RC-RRD-213-07-150	Restrictive Covenant	No potable or potable wells to be installed	CA based on Commercial LU
301 S Center St	NCA-RRD-213-07-012	Notice of Corrective Action	Refer to DEQ reference	CA complete.

6. Brownfield Sites

A brownfield is defined by USEPA as a “...real property, the expansion, redevelopment, or reuse of which may be complicated by the presence of potential presence of a hazardous substance, pollutant, or contaminant.”

Because the cost of environmental cleanup presents a barrier to remediation and redevelopment of contaminated or derelict properties, federal, state and community-based mechanisms for financing such efforts were instituted to incentivize and facilitate redevelopment. Contaminated and/or blighted sites that meet the criteria for these financing programs are called “brownfields”. In addition to financing mechanisms to remediate contaminated sites, the uncertainties surrounding liability that may be barriers to prospective new landowners and developers are reduced through brownfield programs.

City of Northville Brownfields

As discussed in Section 5, Contaminated Sites, the historical industrial and commercial uses of land within The City has resulted in known or potentially contaminated sites, particularly along the City’s waterways. Furthermore, underutilized and blighted properties exist within the Declared Study Area and are eligible for brownfield program funding. Publicly owned land and easements are also eligible for brownfield funding, which is directly applicable to some of the City’s projects outlined in this Framework Plan. The former McDonald Ford site, subject of the proposed Farmers’ Market, is a candidate for brownfield redevelopment.

- One brownfield site within the City is identified on the EGLE Environmental Mapper: The Garage Grill & Fuel Bar (formerly Cal’s Car Care) at 202 W Main St.
- Two proposed brownfield redevelopments were discussed during Northville’s Brownfield Redevelopment Act (BRA) meeting of November 16, 2021: Northville Downs and Foundry Flask. These proposals are in early development and no documentation of the nature and extent of contamination or brownfield work plans has been made available to the Rouge River Task Force.

- The former General Oil site on Railroad Street and the eastern portion of Ford Field East Park (including the Lower Mill Pond) do not qualify as potential brownfield redevelopment sites due to their CERCLA (Superfund) history. The USEPA does have a Superfund Redevelopment Program that the City could investigate for this property and its redevelopment as part of the Riverwalk.

More brownfield properties likely exist outside of the Study Area. It is worth noting that the EPA provides funding for communities to conduct an inventory of brownfield sites.

City of Northville Brownfield Redevelopment Authority

Michigan’s Brownfield Redevelopment Financing Act (Act 381 of 1996) authorizes municipalities to create a brownfield redevelopment authority to facilitate the implementation of brownfield plans.

In 2018, the City of Northville approved the formation of its Brownfield Redevelopment Authority (City BRA). The City BRA currently meets on an “as needed” basis upon receipt of applications from interested parties. Given the exciting potential of brownfield redevelopment in the City, it is recommended that the City BRA take action in anticipation of future opportunities. Proactive tasks that could be undertaken by the City BRA to this end include:

- Take steps to understand and, to the degree applicable, prior to receiving a brownfield plan, establish its financial measures per Sections 7-12 of Act 381.
- Apply for grants and funding related to preliminary activities such as inventory of brownfield sites in the City; preliminary assessment of brownfield sites; training for staff and/or residents in the field, etc.
- Undertake community outreach to inform residents, property owners, DDA, other stakeholders of the program and its potential applications.
- Initiate an inventory of brownfield within the City.

7. Impervious surfaces

Nonpoint source pollution is runoff that occurs when precipitation or tap water flows across impervious surfaces. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes and oceans, rivers, wetlands, and ground waters. These pollutants can include sediment, fertilizer, oils, and other chemicals.

Impervious surfaces occur in both commercial areas and include rooftops, streets, sidewalks, plazas, porches, driveways, and parking lots.

Nonpoint pollution can also degrade habitat by raising water temperature. This is particularly prevalent in areas where parking lot runoff from warm to hot asphalt enters the river. There are 10 parking lots located along side or near the riparian corridor of the Declared Study Area. (Figure 112)



Figure 112. Parking lots adjacent to or in vicinity of river.

8. Topography

One of the City of Northville's physical assets are its rolling hills that enhance the beauty of its neighborhoods and the downtown. In some areas, however, the variation in topography poses challenges for people with limited mobility, as well as parents with strollers.

A clear example of topography challenges is the steep entrance to Ford Field West from Hutton Street shown in Figure 14 (Section F).

Figure 113 shows the elevation change between the Downs property and E. Cady St. Figure 114 highlights the challenges that topography creates for a Mill Pond Trail.



Figure 113. Staircase connecting Downs property with E. Cady St.



Figure 114. Planning maps for proposed Mill Pond Trail highlight challenges due to elevation change

Glossary of Terms (From the Oxford Languages Dictionary)

Base Flow	The portion of the streamflow that is sustained between precipitation events, fed to streams by delayed pathways. Not to be confused with groundwater flow. Fair weather flow is also called base flow.
Benthic Macro-Invertebrates	Benthic (meaning “bottom-dwelling”) macro-invertebrates are small aquatic animals and the aquatic larval stages of insects. Examples: dragonfly and stonefly larvae, snails, worms, and beetles. Their presence is desirable because it is a positive indicator of water quality for a river.
BGS	Below Ground Surface. Term is typically used when describing soil conditions.
Biome	A large naturally occurring community of flora and fauna occupying a major habitat, e.g. forest or tundra
Bioswales	Channels designed to concentrate and convey stormwater runoff, while removing debris and pollution; beneficial in recharging groundwater. Typically vegetated, mulched, or landscaped in a manner that requires minimal irrigation.
Biota	The animal and plant life of a particular region, habitat, or geological period
Brownfield	A property, expansion, or redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant or contaminant
Culvert	A tunnel carrying a stream, river, or open creek under a road or railroad
Daylighting a river	The process of removing obstructions (such as concrete or pavement) which are covering a river, creek or drainage way to restore them to their previous condition
DO	Dissolved oxygen (DO) is the amount of oxygen that is present in water. Water bodies receive oxygen from the atmosphere and from aquatic plants. Running water, such as that of a swift moving stream, dissolves more oxygen than the still water of a pond or lake. All aquatic animals require dissolved oxygen to breath.
Ecosystem	A biological community of interacting organisms and their physical environment
EGLE	State of Michigan’s Environmental, Great Lakes and Energy division.
Fill	A material that is used to fill a low place or cavity thereby raising the level. Fill is often used to replace natural soils which have been removed.
Flashy flows	A water flow (e.g. stream or river) that experiences a rapid increase in flow shortly after onset of a precipitation event, and an equally rapid return to base conditions shortly after the end of the precipitation event
Impervious	Not allowing fluid, such as rainwater, to pass through
Impervious surfaces	Artificial structures such as pavements that are covered by water-resistant materials such as asphalt, concrete, brick, stone and rooftops. Soils compacted by urban development are also highly impervious.
Hydrologic system	Interrelated components, including the processes of precipitation, evaporation, transpiration, infiltration, groundwater flow, streamflow, etc., in addition to those structures and devices that are used to manage the system
Mycorrhizae	A fungus which grows in association with the roots of a plant in a symbiotic or mildly pathogenic relationship

Glossary of Terms (From the Oxford Languages Dictionary)

Non-Motorized Transportation	Includes Walking and Bicycling, and variants such as Small-Wheeled Transport (skates, skateboards, push scooters and hand carts) and Wheelchair travel.
Nonpoint (source) pollution	Diffuse contamination of water or air that does not originate from a single discrete source. (This type of pollution is often the cumulative effect of small amounts of contaminants gathered from a large area.)
Outfall	The place where a river, creek, or sewer empties into the sea, river, or a lake
Passive Park	A park which can be used for relaxation or gathering. It has no active recreational facilities, such as ball diamonds.
Penstock	A sluice or floodgate for regulating the flow of a body of water.
PUD	Planned Unit Development - a housing development not subject to usual zoning laws, often allowing different styles of homes, homes closer together and mixed in with schools, churches, retail, and recreation facilities, all allowing for a unified look.
Race	A strong or rapid current flowing through a narrow channel in the sea or a river
River Restoration	River restoration refers to a large variety of ecological, physical, spatial and management measures and practices. These are aimed at restoring the natural state and functioning of the river system in support of biodiversity, recreation, flood management and landscape development.
Riparian	Relating to or situated on the river banks; relating to wetlands adjacent to rivers and streams
Riprap	Loose stone used to form a foundation for a breakwater or other structure
Sediment	Solid material matter that is moved and deposited in a new location
Spillway	A passage for surplus water over or around a dam when the reservoir itself is full
Stream bank	Riverbank; the terrain alongside the bed of a river, creek, or stream
Substrate	An underlying substance or layer; the substance or material base on which an organism lives, grows, or obtains its nourishment (example: rock is a substrate for fungi)
Tail Race	A water channel below a dam or water mill.
TSS	Total suspended solids is a water quality measurement usually abbreviated TSS. This parameter was at one time called non-filterable residue, a term that refers to the identical measurement: the dry-weight of particles trapped by a filter, typically of a specified pore size.
Watershed	An area or ridge of land that separates waters flowing to different rivers, basins, or seas

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