



Annette DeMaria, P.E., PMP
Executive Director

- Auburn Hills
- Beverly Hills
- Bingham Farms
- Birmingham
- Bloomfield Hills
- Bloomfield Twp.
- Canton Twp.
- Commerce Twp.
- Dearborn Heights
- Farmington
- Farmington Hills
- Franklin
- Garden City
- Henry Ford College
- Inkster
- Lathrup Village
- Livonia
- Melvindale
- Northville
- Northville Twp.
- Novi
- Oak Park
- Oakland County
- Orchard Lake
- Plymouth
- Plymouth Twp.
- Redford Twp.
- Rochester Hills
- Romulus
- Schoolcraft College
- Southfield
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- University of Michigan-Dearborn
- Van Buren Twp.
- Walled Lake
- Washtenaw County
- Wayne
- Wayne County
- Wayne County Airport Authority
- West Bloomfield Twp.
- Westland
- Wixom

TO: Karen Mondora, ARC Technical Committee Chair

FROM: Annette DeMaria, Executive Director

DATE: January 29, 2021

SUBJECT: 2020 IDEP Investigation Summary

In 2020, ARC staff investigated eight suspicious outfall discharges primarily in the Oakland County portion of the Rouge River Watershed. These outfalls were designated in the Category A and B priority levels for illicit discharge investigations. Of the eight outfalls, two illicit connections were discovered and corrected, three outfalls were determined to be likely impacted by animal feces, and three outfalls will require additional source investigations in 2021.

In 2020, ARC staff worked in five communities to conduct illicit discharge investigations in accordance with the Rouge River Collaborative Illicit Discharge Elimination Plan. These investigations were prompted by the outfall screening efforts conducted in 2018 and 2019, and were conducted in Beverly Hills, Farmington Hills, Northville, and Novi.

The results of the investigations are summarized in Table 1. More detail can be found in the investigation reports which were sent to the communities (Attachment A).

Table 1. Status and Results of Illicit Discharge Investigations

Permittee	Outfall ID	Status	Result
Beverly Hills	BV66	Completed	Residential illicit connection identified and corrected
Beverly Hills	BV51	Ongoing	Further investigation required
Farmington Hills	FH01	Completed	Animal sources suspected
Northville	NV03	Completed	Residential illicit connection identified and corrected
Northville	NV23	Completed	Animal source suspected
Northville	NV22	Ongoing	Further investigation required
Northville	NV57	Ongoing	Further investigation required
Novi	NO23	Completed	Animal sources identified

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- Cranbrook Institute of Science
 - Friends of the Rouge
 - Great Lakes Water Authority
 - Rouge River Advisory Council
 - SEMCOG
 - Southeastern Oakland County Water Authority

Both Beverly Hills and Northville have indicated that the illicit connections identified within their jurisdictions (BV66 and NV03) have been corrected. These corrections were both completed by the end of November, 2020.

In addition, ARC staff partnered with Wayne County to conduct investigations in Inkster because of elevated instream E. coli levels results found in the Lower Rouge in 2020. This involved gathering and graphing existing water quality data to determine the areas of impact, meetings with the City and County and initial IDEP investigations on the Perrin

Drain. These investigations revealed high E. coli that may be the result of an illicit connection.

In 2021, the ARC will continue source investigations on the outstanding issues in accordance with the Plan and as directed by the Technical Committee. This includes resampling outfalls BV66 and NV03 to confirm no other illicit discharges are present in the tributary drains.

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Attachment A
Community-specific Investigation Reports



Annette DeMaria, P.E., PMP
Executive Director

Auburn Hills
Beverly Hills
Bingham Farms
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Dearborn Heights
Farmington
Farmington Hills
Franklin
Garden City
Henry Ford College
Inkster
Lathrup Village
Livonia
Melvindale
Northville
Northville Twp.
Novi
Oak Park
Oakland County
Orchard Lake
Plymouth
Plymouth Twp.
Redford Twp.
Rochester Hills
Romulus
Schoolcraft College
Southfield
Troy
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Van Buren Twp.
Walled Lake
Washtenaw County
Wayne
Wayne County
Wayne County Airport
Authority
West Bloomfield Twp.
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Cooperating Partners:
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Rouge River Advisory Council
SEMCOG
Southeastern Oakland
County Water Authority

TO: Tom Meszler, Village of Beverly Hills Director of Public Services
FROM: Annette DeMaria, Executive Director
DATE: December 22, 2020
SUBJECT: IDEP Investigation Results: Outfall BV51 (Sleepy Hollow Lane)

ARC staff continued illicit discharge investigation on storm sewer outfall BV51 in response to findings from the 2018 outfall screening and 2019 investigations. The September 2020 results indicate that sewage is likely impacting the drain. However, we were unable to narrow down where sewage is entering the drain. Therefore, further investigations are recommended in 2021.

Background

Outfall BV51 was investigated due to the high *E. coli* concentrations found during the outfall survey conducted in 2018. At that time, the *E. coli* concentration was 3,076 MPN/100 ml which can be indicative of an illicit discharge containing sanitary sewage. ARC staff reinspected the outfall in 2019 and found *E. coli* concentrations at 201 and >24,196 MPN/100 ml respectively.

The outfall drains a portion of Sleepy Hollow Lane, Fiddlers Cove Road, and Metamora Lane. The receiving water is an unnamed tributary of the Rouge River (Figure 1). The drain crosses the sanitary sewer at 31403 Sleepy Hollow Lane (Figure 2).

Results

ARC staff reinspected the outfall on August 19, September 15, and November 17, 2020. As was the case in 2019, the results varied greatly in 2020, with *E. coli* concentrations of 573, >24,196, and 1,081 MPN/100 ml respectively (See Table 1). The results from the September and November sampling events showed Human Bacteroides concentrations of 72,000 and <354 gene copies/100 ml respectively. There were no physical signs (ex: odor, staining, debris, organic growth) of a sewage discharge to the storm drain in the outfall or any of the manholes. Likewise, there were no obvious signs of animal fecal impacts to the drain.

Samples were analyzed by Paragon Laboratories for *E. coli* concentration. Additionally, samples were analyzed by Michigan State University's Department of Fisheries & Wildlife for a microbial source tracking (MST) marker to determine whether contamination was human in origin. The marker being used is *Bacteroides thetaiotaomicron* (*B. theta*) which identifies if the bacteria are from the human intestinal track.

Table 1. Sampling Results (*E. coli* in MPN/100 mL and Human *Bacteroides* in gene copies/100 ml)

	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>	Human <i>Bacteroides</i>	<i>E. coli</i>	Human <i>Bacteroides</i>
	7/9/18	8/15/19	9/19/19	8/19/20	9/15/20	9/15/20	11/17/20	11/17/20
BV51-0	3,076	201	>24,196	573	>24,196	72,000	1,081	<354

Conclusions and Recommendations

The high *E. coli* and *Bacteroides* results from September 2020 indicate that sewage is likely impacting the drain. However, the sewage source appears to be inconsistent, so we were not able to narrow it down within the drain. The recommended next steps are for the drain to be televised to determine the potential source of sewage. ARC staff will follow up with the Village to request this work be completed by the Village in 2021.

This work is being completed as outlined in the Rouge River Collaborative IDEP Plan in compliance with the Village’s MS4 permit and as a result of your ARC membership. If you have any questions, I can be reached at 248-765-4085 or ademaria@ectinc.com.

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Figure 1. Storm Drain Location



Figure 2. Sanitary Sewer Location





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Wayne
Wayne County
Wayne County Airport
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West Bloomfield Twp.
Westland
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TO: Tom Meszler, Village of Beverly Hills Director of Public Services
FROM: Annette DeMaria, Executive Director
DATE: August 20, 2020
SUBJECT: IDEP Investigation Results: Outfall BV66 (Village Pines Drive)

ARC staff continued illicit discharge investigation on storm sewer outfall BV66 in response to findings from the 2018 outfall screening and 2019 investigations. We have determined that there is an illicit connection from the residence at 22045 Village Pines Drive that needs to be corrected.

Background

Outfall BV66 was investigated due to the high *E. coli* concentrations found during the outfall survey conducted in 2018. At that time, the *E. coli* concentration was 12,033 MPN/100 ml which can be indicative of an illicit discharge containing sanitary sewage.

ARC staff inspected the outfall and the tributary storm sewer several times in 2019 and 2020. *E. coli*, surfactants and Human *Bacteroides* were sampled along the storm line. The *E. coli* samples were analyzed by Paragon Laboratories, the *Bacteroides* sample was analyzed by Michigan State University's Department of Fisheries & Wildlife, and surfactants were analyzed using a Chemetrics field kit (K-9400).

The outfall and tributary storm sewer primarily receive runoff from Village Pines Drive, west of Lahser Road and south of 14 Mile Road. It also picks up drainage from E. Valley Woods Drive. The receiving water is an unnamed tributary of the Main Branch of the Rouge River. The storm sewer generally runs along the south side of Village Pines Drive, while the sanitary sewer generally runs along the north side (See Figures 1 and 2). The sanitary sewer crosses above the storm sewer at more than one location.

Results

As in 2019, there were no physical signs (ex: odor, staining, debris, organic growth) of a sewage discharge to the storm drain in any of the manholes/catch basins. However, high levels of *E. coli* continued and very high levels of Human *Bacteroides* were found in the outlet (See Table 1). This prompted a CCTV inspection of the sanitary sewer and storm drains to locate the source of the illicit discharge.

The CCTV inspection was conducted by Oakland County Water Resources Commissioners Office in August 2020. The extent of the inspection was as follows (See Figures 1 and 2):

- On the sanitary sewer from MH 23471 downstream to MH 23467
- On the storm drain from BV66-0 upstream to 106' east of BV66-5
- On the storm drain from BV66-4 upstream to BV66-4A

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A suspicious connection to the storm was located at 73.5' west of BV66-5 from the south (See Figures 3A and 3B). The residence of 22045 Village Pines Dr. was subsequently dye tested and the CCTV camera recorded the results (See Figure 3C). While the CCTV operator monitored the storm drain, ARC staff monitored the sanitary sewer. The testing revealed that all bathrooms were draining to the storm drain. Dye testing was completed at the sinks of each bathroom (basement, master, hallway, and garage entrance). No dye showed up in the sanitary sewer.

In addition, we suspect that the footing drain for 22045 Village Pines Dr. is connected to the sanitary sewer and not the storm drain. This is based on the following:

- There was no calcium build-up in the (illicit) connection to the storm drain, while the footing drains for the other homes in the neighborhood showed substantial calcium build-up.
- There is a connection to the sanitary at 63.6' west of MH 23464, which is where the sanitary map shows the sanitary tap from 22045. The flow out of this tap was continuous and clear and there was minor calcium build-up present (Figures 4A – 4C).

After a desktop review of the CCTV footage, no other illicit connections are suspected to be tributary to outfall BV66-0, at this time. In addition, there were no obvious signs of exfiltration from the sanitary sewer which could have impacted the water quality in the storm drain, since the sanitary is at a higher elevation than the storm drain.

Conclusions and Recommendations

We have determined that there is an illicit connection to the storm drain from the residence at 22045 Village Pines Dr. The connection is a violation of Chapter 30 (Surface Water Drainage), Section 30.06 of the City's Code of Ordinances, and needs to be eliminated. In accordance with the City's Municipal Separate Storm Sewer System (MS4) permit, the City is required to request the property owner to eliminate the discharge, so it no longer impacts waters of the State. The property owner has 120 days to eliminate the discharge as outlined in Section 30.12 of Chapter 30.

Once the correction is made, we suggest that the Village jet and vacuum the storm sewer to remove residual sanitary waste. Then notify the ARC and we will resample the outfall to confirm no other issues are present.

Although not the subject of this investigation, we also suspect that the footing drain from the same home is improperly connected to the sanitary sewer, but this should be confirmed with a dye test. If confirmed, this connection may be a violation of the State's Plumbing Code and should be addressed accordingly.

This work is being completed as outlined in the Rouge River Collaborative IDEP Plan in compliance with the Village's MS4 permit and as a result of your ARC membership. If you have any questions, I can be reached at 248-765-4085 or ademaria@ectinc.com.

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Table 1. Sampling Results (*E. coli* in MPN/100 ml; Surfactants in mg/l; Bacteroides in gene copies/100 ml)

Structure	Location	<i>E. coli</i>		<i>E. coli</i>	Surfactants	<i>E. coli</i>	Human Bacteroides	<i>E. coli</i>	Human Bacteroides	<i>E. coli</i>	<i>E. coli</i>
		6/26/2018	8/6/2019	12/12/2019		12/19/2019		7/2/2020	8/5/2020	8/6/2020	
BV66-0	Outlet to unnamed tributary	12,033	>24,196	292	0.75	9,804	527,000	2,755	1,120,000		
BV66-1	Manhole in the lawn south of the house							17,239			
BV66-2	Manhole on south side of street		>24,196					15,531			
BV66-3	Buried manhole in the lawn on south side of street			4,106	0.75	8,164	<354				
BV66-4	Manhole on south side of street		>24,196					4,611			
BV66-4A	Beehive catch basin on north side of street under pine trees			10	0.25	<10	<354	10	<10		
BV66-4-18"	18" inlet to BV66-4 (coming from BV66-4A)									1,830*	
BV66-4-24"	24" inlet to BV66-5 (coming from BV66-5)									36,540	
BV66-5	Manhole in the island		10	20				185			
BV66-5 SE	SE inlet to BV66-5								<10		
BV66-5 CB-EE	Road inlet on east side of cul-de-sac										20
BV66-5 CB-N	Road inlet on north side of Village Pines Dr.										359
BV66-5 E	East inlet to BV66-5										63

*rust colored sample contaminated by material stirred up by the CCTV camera

Figure 2. Sanitary Sewer Location

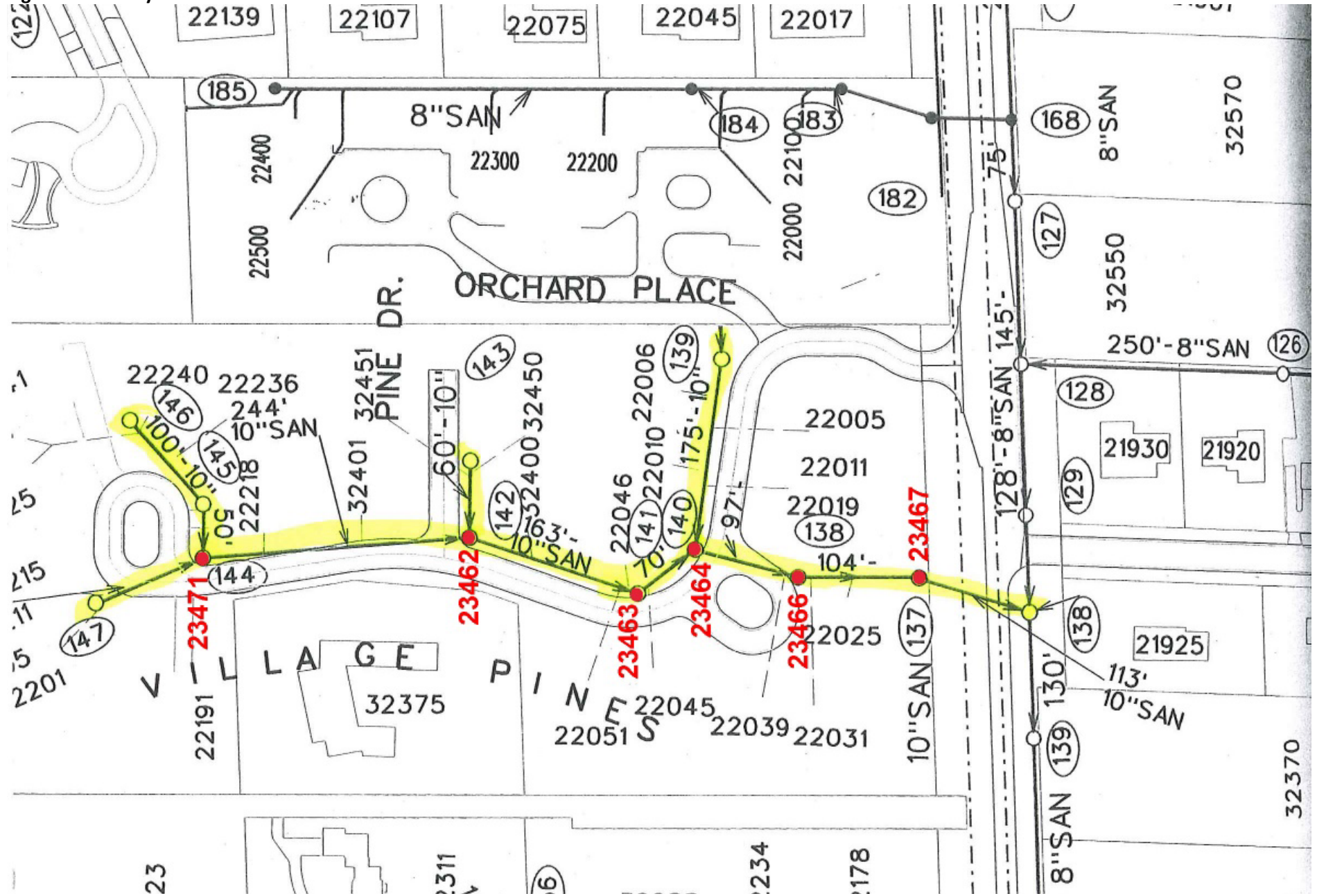


Figure 3A. Illicit connection to storm drain at 11:00 at 73.5' west of BV66-5 (or 33.5' east of BV66-4) – note sanitary debris in the drain



Figure 3B. Close up of illicit connection – note gray staining at the outlet



Figure 3C: Dye testing results from basement bathroom



Figure 4A: Possible footing drain tap at 9:00 at 63.6' west of MH 23464 (or 6.5' east of MH 23463) – note minor calcium build-up under the tap



Figure 4B: Close up of possible footing drain connection



Figure 4C: Close up of possible footing drain connection – note calcium build-up in tap





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TO: Karen Mondora, City of Farmington Hills Director of Public Services
FROM: Annette DeMaria, Executive Director
DATE: November 30, 2020
SUBJECT: IDEP Investigation Results: Outfall FH01 (Tulane Avenue)

ARC staff have conducted an illicit discharge investigation on storm sewer outfall FH01¹ in response to findings from the ARC's 2018 outfall screening and follow-up sampling conducted in 2019. We suspect that animal feces are likely responsible for the high *E. coli* readings. No further action is necessary at this time.

Background

Outfall FH01 was originally investigated due to very high *E. coli* concentration (>24,196 MPN/100 mL) found during an outfall screening conducted April 27, 2018. There was no observed color, odor, turbidity, or other unusual characteristics noted during the initial screening.

ARC staff reinspected the outfall on December 13 and 19, 2019 and found similar conditions as seen in the original inspection. Water samples were taken from the outfall, along with water samples from four upstream manholes in an effort to narrow down possible sources of *E. coli* contamination.

The outfall drains a portion of Tulane Avenue north of Nine Mile Road and receives runoff from the residential properties along portions of Astor Street, Colgate Street, and Albion Avenue. The receiving water is an unnamed tributary of the Main Branch of the Rouge River (See Figure 1).

Results

ARC staff reinspected the outfall on July 2, and August 18, 2020 and found similar *E. coli* conditions as seen in the original inspection. Water samples were taken from the outfall and from one upstream manhole in an effort to narrow down possible sources of *E. coli* contamination. Additional samples were not collected from more locations due to a lack of flow in upstream manholes.

Samples were analyzed by Paragon Laboratories for *E. coli* concentration. Additionally, samples were analyzed by Michigan State University's Department of Fisheries & Wildlife for a microbial source tracking (MST) marker to determine whether contamination was human in origin. Human Bacteroides is a microbial source tracking method used for identifying if bacteria are from the human intestinal track.

Cooperating Partners:

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Great Lakes Water Authority
Rouge River Advisory Council
SEMCOG
Southeastern Oakland
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¹ Also identified as fhc.01.

The outfall and upstream manhole had high *E. coli* levels, but the Human Bacteroides analysis did not show a sewage signature for three of the four water samples and the sewage signature on the fourth sample was only moderately high (See Table 1). There were no physical signs (ex: odor, staining, debris, organic growth) of a sewage discharge to the storm drain in the outfall or any of the manholes. Likewise, there were no obvious signs of animal fecal impacts to the drain.

Table 1. Sampling Results

Structure	Location	<i>E. coli</i> result	<i>E. coli</i> result	<i>E. coli</i> result	Human Bacteroides (gene copies/ 100 ml)	<i>E. coli</i> result	Human Bacteroides (gene copies/ 100 ml)	<i>E. coli</i> result	Human Bacteroides (gene copies/ 100 ml)
		(MPN/100 ml)	(MPN/100 ml)	(MPN/100 ml)		(MPN/100 ml)		(MPN/100 ml)	
		4/27/2018	12/13/2019	12/19/2019	12/19/2019	7/2/2020	7/2/2020	8/18/2020	8/18/2020
FH01-0	Outfall to unnamed tributary	> 24,192	1,246	9,208	< 354	>24,196	3,630	8,664	<354
FH01-1W	West inlet to first upstream manhole at Tulane & Astor		1,314			>24,196	< 354		
FH01-2N	Trough of manhole north of FH01-1W at Tulane & Astor		<10						
FH01-2W	North inlet to second upstream manhole at Albion & Astor		<10						
FH01-3W	Trough of third upstream manhole at Colgate & Astor		197						

Conclusions and Recommendations

Based on the data collected to date, we suspect that the source of the high *E. coli* is from animal feces, rather than from sewage. This determination is made because the high *E. coli* levels coincide with low Human Bacteroides levels which indicates that the *E. coli* is not from a human source. Given that there were no obvious signs of animal sources to the drain, no further action is recommended at this time.

This work is being completed as outlined in the Rouge River Collaborative IDEP Plan in compliance with the City's MS4 permit and as a result of your ARC membership. If you have any questions, I can be reached at 313-963-6600 or ademaria@ectinc.com.

cc: John Beisel, City of Farmington Hills

Attachment: Figure 1. Storm Sewer and Sampling Location

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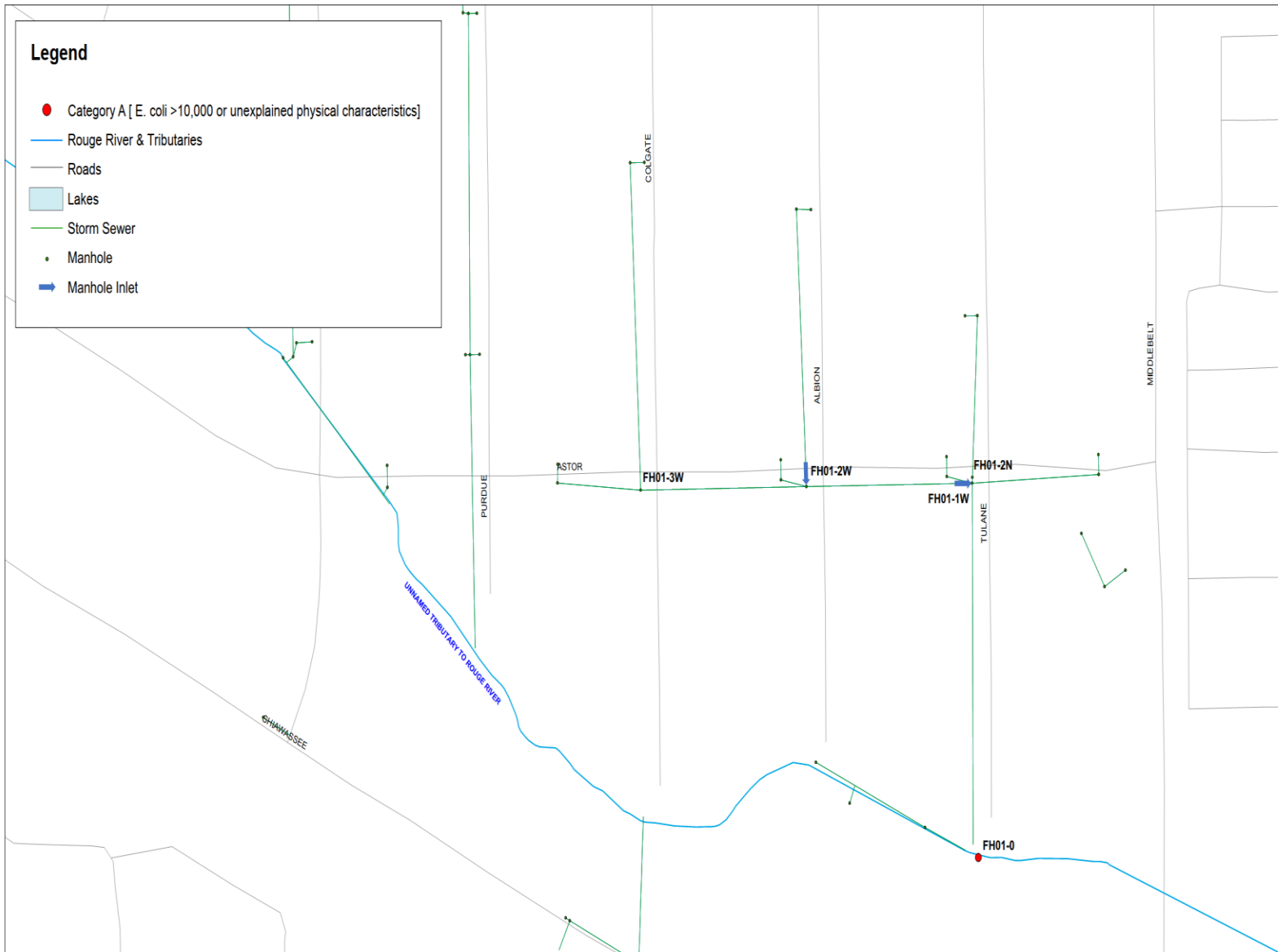
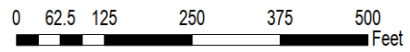


Figure 1. Storm Sewer Location





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TO: Loyd Cureton, Director, Northville Department of Public Works
FROM: Annette DeMaria, Executive Director
DATE: September 1, 2020
SUBJECT: IDEP Investigation Results: Outfall NV03 (Glenhill Drive)

In 2020, ARC staff continued illicit discharge investigation on storm sewer outfall NV03 in response to findings from the 2018 outfall screening and 2019 investigations. We have determined that there is an illicit connection from the residence at 1009 Glenhill Drive that needs to be corrected.

Background

Storm sewers connected to outfall NV03 were investigated due to the high *E. coli* concentrations found during the outfall survey conducted in 2018. Because the outfall was partially submerged, water samples from two upstream manholes were taken for *E. coli* analysis. One of these manholes (NV03-2S) had an *E. coli* concentration of >24,196 MPN/100 mL.

Manhole NV03-2S is located in Shannon Court and receives runoff from residential properties along portions of Glenhill Drive, Whitegate Drive, Andover Drive, Portsmere Court, and Abbey Court (See Figure 1). The receiving water is an unnamed tributary of the Middle Branch of the Rouge River.

ARC staff revisited the area several times in 2019 and 2020 to take water samples from various manholes across the drainage area in order to narrow down possible sources of *E. coli* contamination. *E. coli* and Human *Bacteroides* were sampled along the storm line. The *E. coli* samples were analyzed by Paragon Laboratories, and the *Bacteroides* sample was analyzed by Michigan State University’s Department of Fisheries & Wildlife.

Results

High levels of *E. coli* and very high levels of Human *Bacteroides* were found in manhole NV03-6W, however other manholes did not have high levels of *E. coli* (See Table 1). In addition, a sewage odor and sanitary debris were observed in the catch basins along Glenhill Drive that are connected to NV03-6W.

This prompted a CCTV inspection of the storm drain connected to NV03-6W to locate the source of the illicit discharge. The CCTV inspection was conducted by the City of Northville in August 2020. The extent of the inspection included the storm drain on the west side of Glenhill Drive, extending west approximately 180’ from NV03-6W-1, and south 300’ to the next manhole. The south pipe was not shown on the City’s maps but extends past 1003 Glenhill west of the sanitary sewer (See Figure 1).

Cooperating Partners:
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Friends of the Rouge
Great Lakes Water Authority
Rouge River Advisory Council
SEMCOG
Southeastern Oakland
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The residences of 1003, 1009, 1015, and 1021 Glenhill Drive were subsequently dye tested. City staff monitored the storm drain and the sanitary sewer while ARC staff dye tested all bathrooms in each house. The testing revealed that all bathrooms at 1009 Glenhill Drive were draining to the storm drain. Dye testing was completed at the sinks of each bathroom (first floor, upstairs, and master). No dye showed up in the sanitary sewer. The connection to the storm was located 150' south of NV03-6W-1 (See Figures 2A and 2B).

The dye testing of the other houses indicated that they were properly connected to the sanitary sewer.

Conclusions and Recommendations

We have determined that there is an illicit connection to the storm drain from the residence at 1009 Glenhill Dr. The connection is a violation of Chapter 86 (Utilities), Division 2 (Illicit Discharge Elimination Program) of the City's Code of Ordinances, and needs to be eliminated. In accordance with the City's Municipal Separate Storm Sewer System (MS4) permit, the City is required to request the property owner to eliminate the discharge, so it no longer impacts Waters of the State. The property owner is required to achieve compliance within the time period set forth within the notice given by the City, as outlined in Section 86-119.

Once the correction is made, we suggest that the City jet and vacuum the storm sewer to remove residual sanitary waste. Then notify the ARC and we will resample the storm drain to confirm no other issues are present.

This work is being completed as outlined in the Rouge River Collaborative IDEP Plan in compliance with the City's MS4 permit and as a result of your ARC membership. If you have any questions, I can be reached at 248-765-4085 or ademaria@ectinc.com.

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Table 1. Sampling Results (*E. coli* in MPN/100 ml; Surfactants in mg/l; Bacteroides in gene copies/100 ml)

Structure	Location	<i>E. coli</i>	<i>E. coli</i> (MPN/100 ml)	Human <i>Bacteroides</i> marker (gene copies/100 ml)	<i>E. coli</i> result	Human <i>Bacteroides</i> marker (gene copies/100 ml)	<i>E. coli</i> (MPN/100ml)	Human <i>Bacteroides</i> marker (gene copies/100 ml)
		6/8/2018	12/13/2019		12/19/2019		7/2/2020	7/2/2020
NV03-2S	Manhole in Shannon Ct.	>24,192						
NV03-2S-W	South inlet to manhole on Shannon Ct		<10	<354	<10		31	ND
NV03-2S-S	West inlet to manhole on Shannon Ct		573	928	2,489	1,510		
NV03-6W	West inlet to manhole on Glenhill Dr		1,658		3,076	543	17,329	347,000
NV03-6S	South inlet to manhole on Glenhill Dr		<10				20	
NV03-11	Trough of the manhole at Glenhill Dr and Whitegate		30				63	

Figure 1. Storm Sewer Location Map

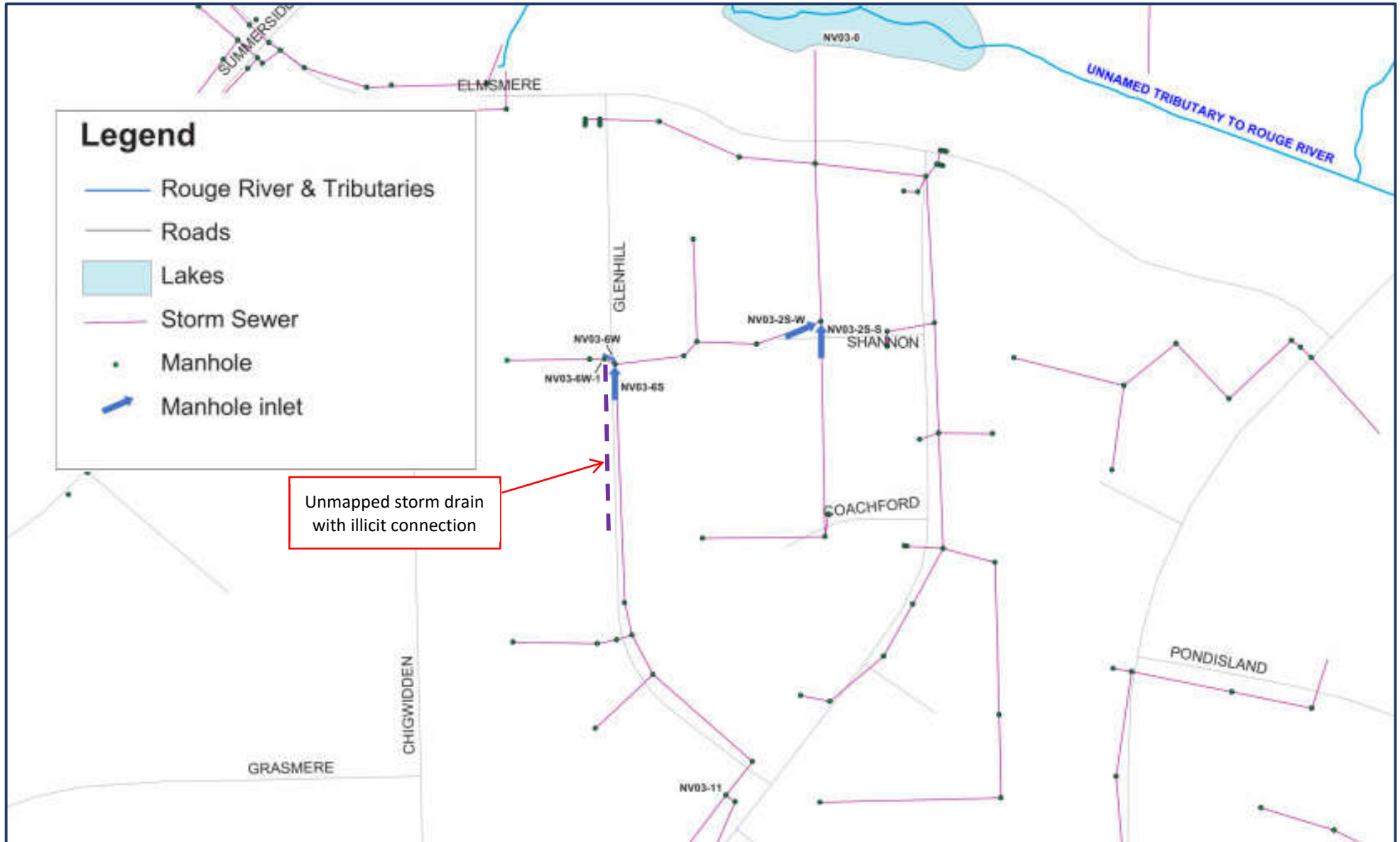
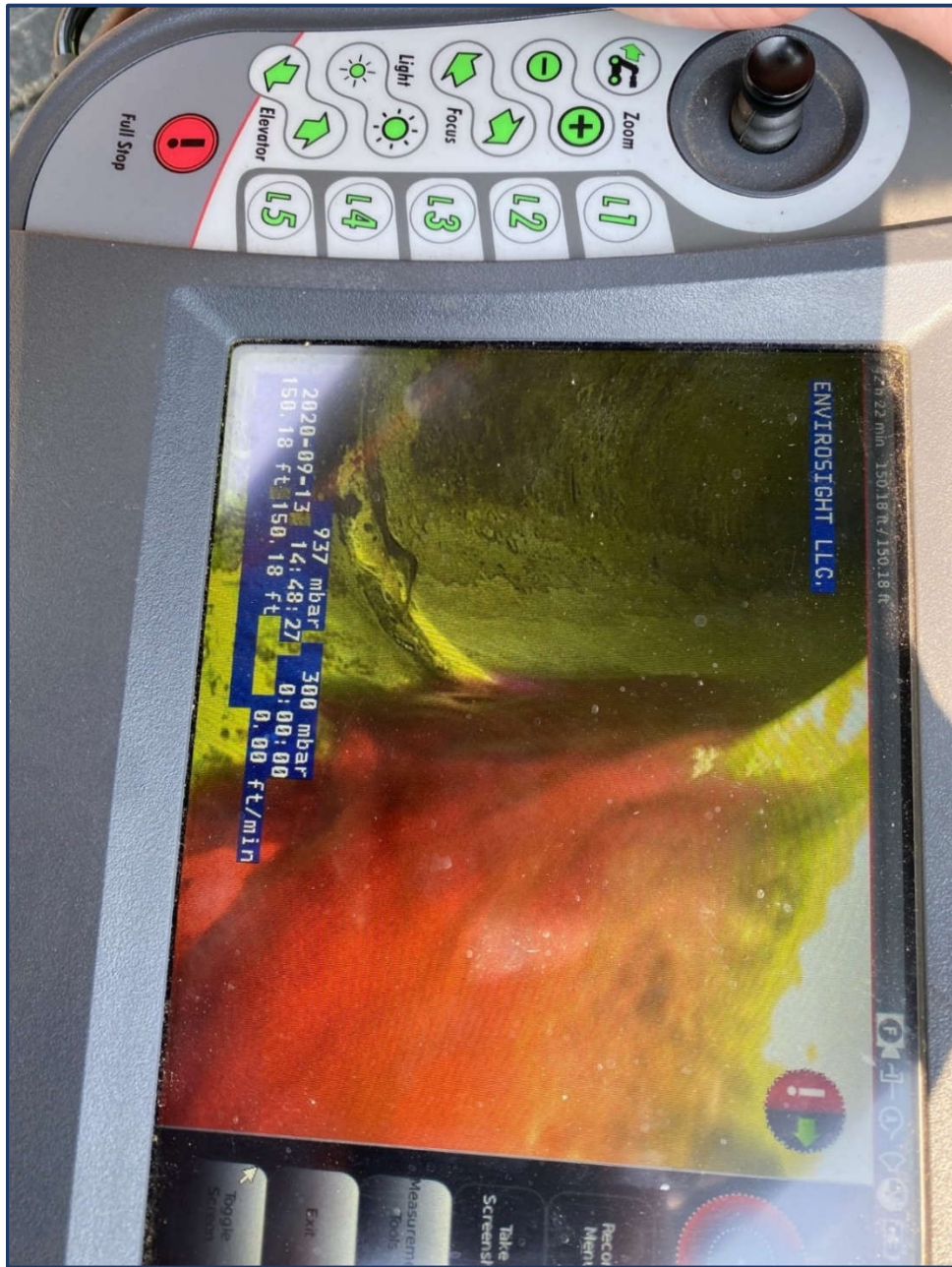


Figure 2A. Illicit connection to storm drain at 150' south of manhole NV03-6W-1 located on the west side of Glenhill Drive. Green dye exiting the sewer lead to the storm drain from testing of the first floor bathroom of 1009 Glenhill Dr.



Figure 2B. Red dye exiting the sewer lead to the storm drain from testing of the upstairs bathroom of 1009 Glenhill Dr.





Annette DeMaria, P.E., PMP
Executive Director

Auburn Hills
Beverly Hills
Bingham Farms
Birmingham
Bloomfield Hills
Bloomfield Twp.
Canton Twp.
Commerce Twp.
Dearborn Heights
Farmington
Farmington Hills
Franklin
Garden City
Henry Ford College
Inkster
Lathrup Village
Livonia
Melvindale
Northville
Northville Twp.
Novi
Oak Park
Oakland County
Orchard Lake
Plymouth
Plymouth Twp.
Redford Twp.
Rochester Hills
Romulus
Schoolcraft College
Southfield
Troy
University of
Michigan-Dearborn
Van Buren Twp.
Walled Lake
Washtenaw County
Wayne
Wayne County
Wayne County Airport
Authority
West Bloomfield Twp.
Westland
Wixom

TO: Loyd Cureton, City of Northville
FROM: Annette DeMaria, Executive Director
DATE: January 4, 2021
SUBJECT: IDEP Investigation Results: Outfall NV22

ARC staff have conducted an illicit discharge investigation on storm sewer outfall NV22 in response to findings from the ARC's 2018 outfall screening and follow-up sampling conducted in 2019. We have determined that additional investigations are needed in order to determine if an illicit discharge is impacting the storm drain.

Background

Outfall NV22 was investigated due to high *E. coli* concentration (2,755 MPN/100 mL) found during an outfall screening conducted June 7, 2018. There was no observed color, odor, turbidity, or other unusual characteristics noted during the initial screening.

ARC staff reinspected the outfall on August 15, 2019 and found higher *E. coli* concentrations (>24,196 MPN/100 mL) and similar conditions as seen in the original inspection, with low flow noted.

The outfall drains a portion of Allen Drive, Novi Street, and other adjoining streets north of Eight Mile Road. Based on the available GIS information, it is unclear which storm drains at the intersection of Hill and Novi Streets discharge to NV22. The receiving water is the Walled Lake Branch of the Middle Rouge River (See Figure 1).

Results

ARC staff reinspected the outfall on July 1, and August 18, 2020 and found lower *E. coli* levels compared to the original inspection. Water samples were taken from the outfall and from two pipes in an upstream manhole in an effort to narrow down possible sources of *E. coli* contamination. These samples were also tested for Human Bacteroides, which were found at low levels as well.

Samples were analyzed by Paragon Laboratories for *E. coli* concentration. Additionally, samples were analyzed by Michigan State University's Department of Fisheries & Wildlife for a microbial source tracking (MST) marker to determine whether contamination was human in origin. Human Bacteroides is a microbial source tracking method that uses the B. theta biomarker to determine if bacteria are from the human intestinal track.

Cooperating Partners:

Cranbrook Institute of Science
Friends of the Rouge
Great Lakes Water Authority
Rouge River Advisory Council
SEMCOG
Southeastern Oakland
County Water Authority

Table 1. Sampling Results

Structure	<i>E. coli</i> (MPN/ 100mL)	<i>E. coli</i> (MPN/ 100mL)	<i>E. coli</i> (MPN/ 100mL)	Human <i>Bacteroides</i> (gene copies/100 ml)	<i>E. coli</i> (MPN/ 100mL)	Human <i>Bacteroides</i> (gene copies/100 ml)
	6/7/2018	8/15/2019	7/1/2020	7/1/2020	8/18/2020	8/18/2020
NV22-0	2,755	>24,196	108	582	<10	<354
NV22-2W-N			404	747		
NV22-2W-W			201			

Conclusions and Recommendations

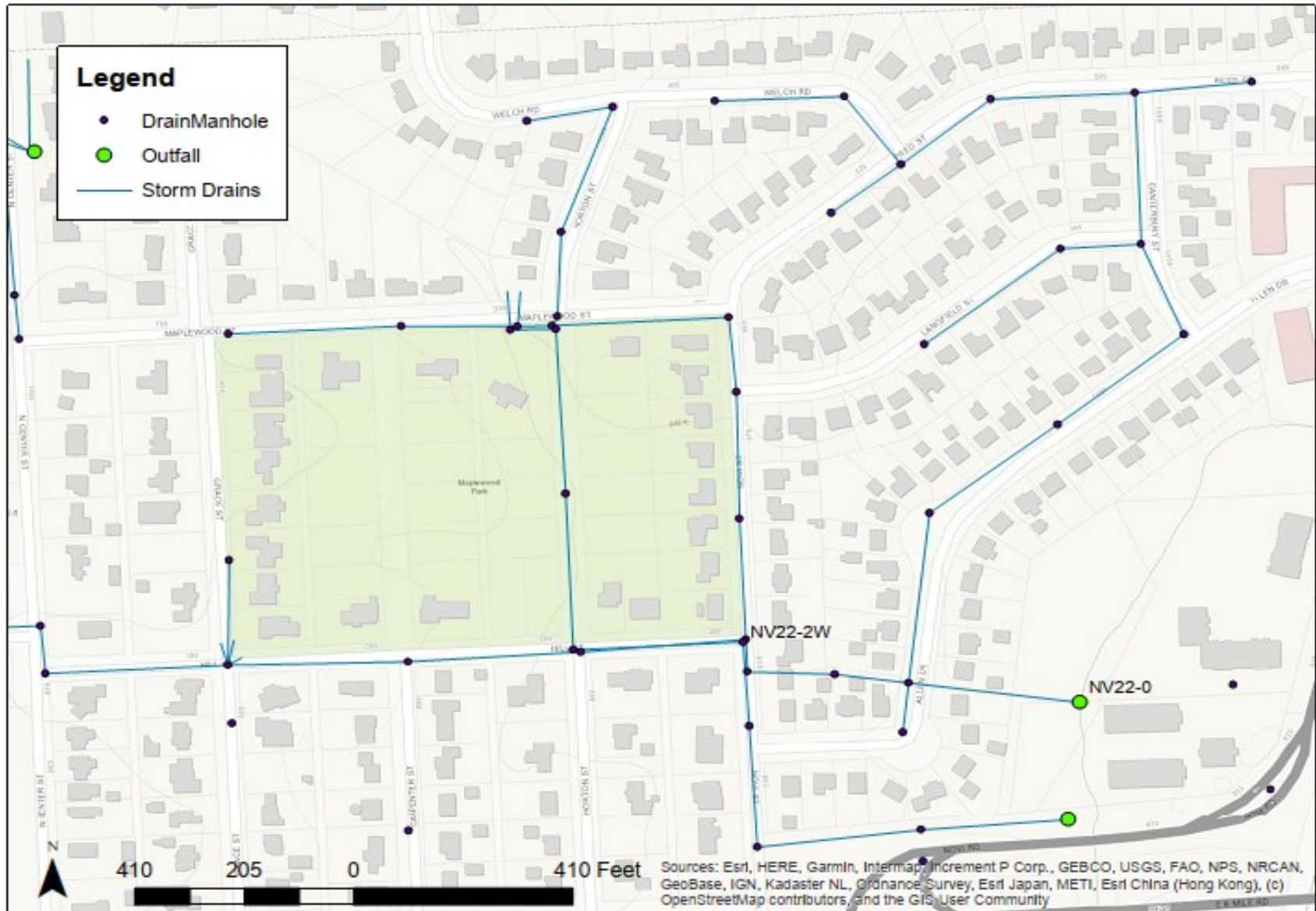
Given that both the *E. coli* and *Bacteroides* were low in the samples, the results of the testing are inconclusive in identifying the source of the *E. coli*. Therefore, additional investigations are needed. ARC staff will continue these investigations in 2021 following a meeting with DPW staff to better understand the extent of the drainage network.

This work is being completed as outlined in the Rouge River Collaborative IDEP Plan in compliance with the City’s MS4 permit and as a result of your ARC membership. If you have any questions, I can be reached at 313-963-6600 or ademaria@ectinc.com.

Attachment: Figure 1. Storm Sewer and Sampling Location

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Figure 1: Storm Sewer and Sampling Locations for NV22





Annette DeMaria, P.E., PMP
Executive Director

Auburn Hills
Beverly Hills
Bingham Farms
Birmingham
Bloomfield Hills
Bloomfield Twp.
Canton Twp.
Commerce Twp.
Dearborn Heights
Farmington
Farmington Hills
Franklin
Garden City
Henry Ford College
Inkster
Lathrup Village
Livonia
Melvindale
Northville
Northville Twp.
Novi
Oak Park
Oakland County
Orchard Lake
Plymouth
Plymouth Twp.
Redford Twp.
Rochester Hills
Romulus
Schoolcraft College
Southfield
Troy
University of
Michigan-Dearborn
Van Buren Twp.
Walled Lake
Washtenaw County
Wayne
Wayne County
Wayne County Airport
Authority
West Bloomfield Twp.
Westland
Wixom

Cooperating Partners:

Cranbrook Institute of Science
Friends of the Rouge
Great Lakes Water Authority
Rouge River Advisory Council
SEMCOG
Southeastern Oakland
County Water Authority

TO: Loyd Cureton, City of Northville

FROM: Annette DeMaria, Executive Director

DATE: December 16, 2020

SUBJECT: IDEP Investigation Results: Outfall NV57 (First Street)

ARC staff have conducted an illicit discharge investigation on storm sewer outfall NV57 in response to findings from the ARC's 2018 outfall screening and follow-up sampling conducted in 2019. The August 2020 results indicate that sewage may be impacting the drain. However, we were unable to narrow down where sewage is entering the drain. Therefore, further investigations are recommended in 2021.

Background

Manhole NV57-1 was investigated due to high *E. coli* concentration (3,876 MPN/100 ml) found during an outfall screening conducted June 8, 2018. There was no observed color, odor, turbidity, or other unusual characteristics noted during the initial screening. ARC staff reinspected manhole NV57-1 on August 15, 2019 and found an *E. coli* concentration of 6,131 MPN/100 ml.

The outfall drains First Street and a portion of West Cady Street, north of Seven Mile Road. The receiving water is Johnson Drain, which feeds into the Walled Lake Branch of the Middle Rouge River (See Figure 1).

Results

ARC staff reinspected manholes and collected samples from three upstream manholes to narrow down possible sources of *E. coli* contamination. Although these efforts yielded inconsistent results, the August data did show a strong sewage signal at manhole NV57-1 as demonstrated by the very high Bacteroides results. Another high Bacteroides concentration was found at manhole NV-573E. All other Bacteroides results were below detection limits (See Table 1).

In terms of *E. coli*, manhole NV57-1 had moderately high levels in July, August, September, and November but it was not detectable at other manholes. There were no physical signs (ex: odor, staining, debris, organic growth) of a sewage discharge to the storm drain in any of the manholes. Likewise, there were no obvious signs of animal fecal impacts to the drain.

Samples were analyzed by Paragon Laboratories for *E. coli* concentration. Additionally, samples were analyzed by Michigan State University's Department of Fisheries & Wildlife for a microbial source tracking (MST) marker to determine whether contamination was human in origin. The marker being used is *Bacteroides thetaiotaomicron* (*B. theta*) which identifies if the bacteria are from the human intestinal track.

Table 1. Sampling Results (*E. coli* in MPN/100 mL and Human *Bacteroides* in gene copies/100 ml)

Structure		NV57-1	NV57-2	NV57-3E	NV57-3N
Location		Manhole at corner where Fairbrook St meets 7 Mile Rd	Manhole located in front of 320 and 310 1 st St	Manhole at intersection of W Cady St and 1 st St	Manhole at intersection of W Cady St and 1 st St
<i>E. coli</i>	6/8/18	3,876			
<i>E. coli</i>	8/15/19	6,131			
<i>E. coli</i>	7/2/20	1,012			<10
Human <i>Bacteroides</i>	7/2/20	<354			<354
<i>E. coli</i>	8/18/20	1,137			
Human <i>Bacteroides</i>		433,000			
<i>E. coli</i>	9/15/20	6,867	<10	<10	<10
Human <i>Bacteroides</i>		<354	<354	47,200	<354
<i>E. coli</i>	11/19/20	1,789	41	41	41
Human <i>Bacteroides</i>		<354	<354	<354	<354

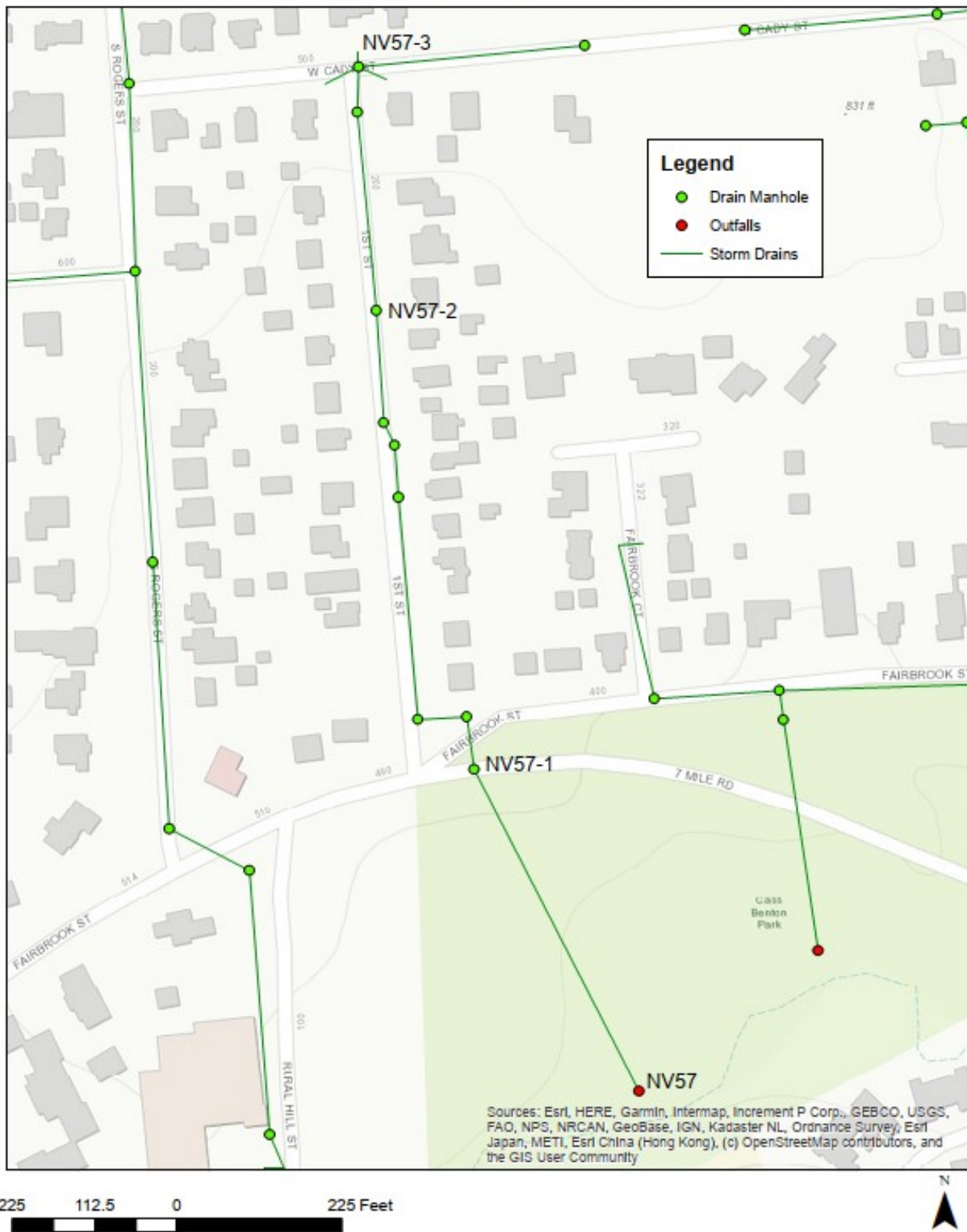
Conclusions and Recommendations

The high *Bacteroides* results from August and September 2020 indicate that sewage may be impacting the drain. However, the sewage source appears to be inconsistent, and we were not able to narrow it down within the drain. The recommended next steps are for the drain to be televised to determine the potential source of sewage. ARC staff will follow up with the City to request this work be completed in 2021.

This work is being completed as outlined in the Rouge River Collaborative IDEP Plan in compliance with the City’s MS4 permit and as a result of your ARC membership. If you have any questions, I can be reached at 313-963-6600 or ademaria@ectinc.com.

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Figure 1: Storm Sewer and Sampling Locations for NV57





Annette DeMaria, P.E., PMP
Executive Director

- Auburn Hills
- Beverly Hills
- Bingham Farms
- Birmingham
- Bloomfield Hills
- Bloomfield Twp.
- Canton Twp.
- Commerce Twp.
- Dearborn Heights
- Farmington
- Farmington Hills
- Franklin
- Garden City
- Henry Ford College
- Inkster
- Lathrup Village
- Livonia
- Melvindale
- Northville
- Northville Twp.
- Novi
- Oak Park
- Oakland County
- Orchard Lake
- Plymouth
- Plymouth Twp.
- Redford Twp.
- Rochester Hills
- Romulus
- Schoolcraft College
- Southfield
- Troy
- University of Michigan-Dearborn
- Van Buren Twp.
- Walled Lake
- Washtenaw County
- Wayne
- Wayne County
- Wayne County Airport Authority
- West Bloomfield Twp.
- Westland
- Wixom

- Cooperating Partners:
- Cranbrook Institute of Science
 - Friends of the Rouge
 - Great Lakes Water Authority
 - Rouge River Advisory Council
 - SEMCOG
 - Southeastern Oakland County Water Authority

TO: Kate Richardson, City of Novi Plan Review Engineer

FROM: Annette DeMaria, Executive Director

DATE: September 4, 2020

SUBJECT: IDEP Investigation Results: Outfall NO23 (Park Ridge Court)

Following cleaning of the storm drain on Park Ridge Court, the *E. coli* counts in the storm drain were no longer elevated. This indicates that the source of the high *E. coli* was the wildlife feces that had accumulated in manhole NO23-2.

Background

Outfall NO23 was investigated in 2019 by Alliance of Rouge Communities (ARC) staff due to the high *E. coli* concentrations found during the outfall survey conducted in 2018. The 2019 investigations revealed wildlife feces accumulated in manhole NO23-2 and low concentrations of human *Bacteroides* (table 1).

The outfall drains a portion of Park Ridge Court which is a residential area north of 10 Mile Road and west of Meadowbrook Road (Figure 1). The receiving water is Walled Lake Branch which drains to the Middle Branch of the Rouge River.



Wildlife scat in Manhole NO23-2 in 2019

2020 Effort

On March 4, 2020, the City cleaned the storm drain along Park Ridge Court. ARC staff re-inspected the system the following day. Feces were no longer present in manhole NV23-2 and the *E. coli* concentration at the downstream manhole was much lower (Table 1).

Conclusions and Recommendations

Based on the information collected to date, the wildlife feces appear to be responsible for the elevated *E. coli* found in 2018 and 2019. We recommend that the City re-inspect and clean this manhole periodically if feces accumulate again. A suggested inspection frequency is monthly, but this should be modified based on the inspection findings. This will reduce water quality impacts to the river.

Table 1. Sampling Results for Park Ridge Court Storm Sewer

Structure	Location	<i>E. coli</i> (MPN/100 ml)		Surfactants (mg/l)	Human <i>Bacteroides</i> (gene copies/100 ml)	<i>E. coli</i> (MPN/100 ml)
		2018	12/13/19		3/5/20	
NO23-0	Outlet to Walled Lake Branch	Submerged, not sampled				
NO23-1	Manhole 1 at west end of island	7,701	10,462	1.0	1,890	1,616
NO23-2	Manhole 2 east of manhole 1		Too little flow to sample			

This work was completed as outlined in the Rouge River Collaborative IDEP Plan in compliance with the City’s MS4 permit and as a result of your ARC membership. If you have any questions, I can be reached at 313-963-6600 or ademaria@ectinc.com.

Attachment: Figure 1. Storm Sewer and Sampling Locations

Figure 1. Storm Sewer Location

