Annette DeMaria, P.E., PMP
Executive Director

TO: **Karen Mondora, ARC Technical Committee Chair**

FROM: **Emily Levine, Technical Committee Coordinator**

DATE: **February 15, 2022**

SUBJECT: **2021 IDEP Investigation Summary**

In 2021, ARC staff investigated three suspicious outfall discharges 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 three outfalls, two outfalls were determined to be likely impacted by animal feces, and one outfall will require additional source investigations in 2022. In addition, ARC staff completed follow-up sampling at two outfall locations to confirm that corrections made to illicit connections in 2020 had resolved the issues.

In 2021, ARC staff worked in two 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 and Northville.

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	Resampling confirmed effective correction to illicit connection
Beverly Hills	BV51	Ongoing	Further investigation required
Northville	NV03	Completed	Resampling confirmed effective correction to illicit connection
Northville	NV22	Completed	Animal source suspected
Northville	NV57	Completed	Animal source suspected

In addition, ARC staff partnered with Wayne County to conduct investigations in Inkster because of elevated instream E. coli results found in the Lower Rouge in 2020. This involved sampling in the Perrin Drain and walking the Lower Rouge between Inkster Road and Beech Daly to investigate outfalls. These investigations revealed high *E. coli* that may be the result of an illicit connection.

In 2022, ARC staff will continue source investigations on the outstanding issues in accordance with the Plan and as directed by the Technical Committee. This will also include assisting Wayne County with investigations in Livonia.

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Attachment A
Community-specific Investigation Reports

Annette DeMaria, P.E., PMP
Executive Director

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TO: **Mike Domine, City of Northville**

FROM: **Emily Levine, ARC Staff**

DATE: **August 5, 2021**

SUBJECT: **IDEP Investigation Results: Outfall NV57**

ARC staff conducted an illicit discharge investigation on storm drain outfall NV57 in response to findings from the ARC's 2018 outfall screening and follow-up sampling conducted in 2019, and 2020. We suspect that *E. coli* from non-sewage sources were likely contained in the sediment built up in the storm drain near West Cady Street and First Street because removal of that sediment appears to have corrected the issue. If construction continues in the area, ARC Staff recommends monitoring the storm drain for additional sediment build up and cleaning it out when observed.

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. ARC staff reinspected manhole NV57-1 on August 15, 2019 and found an *E. coli* concentration of 6,131 MPN/100 ml. ARC staff reinspected manholes and collected samples from three upstream manholes to narrow down possible sources of *E. coli* contamination in 2020 (Table 1). 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. There were no physical signs (ex: odor, staining, debris, organic growth) of a sewage discharge to the storm drain during any of these sampling events. Likewise, there were no obvious signs of animal fecal impacts to the drain.

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 coordinated with the City of Northville to televise the storm drain line along First Street on April 21, 2021. Except for a section near West Cady Street and a section in the middle of the block which were blocked by sediment, the storm drain line along First Street from 7 Mile Road to West Cady Street was televised. A tap that appeared to be from a downspout on a house and a connection that appeared to be from a sump pump were identified. No other connections were identified.

The storm drain along West Cady Street to the east of First Street had too much sediment for televising. Manhole NV57-1 was sampled that day and high *E. coli* concentrations were found. Additional samples collected on April 29, 2021 found high *E. coli* concentrations and low Bacteroides results, except for NV57-2, which had high Bacteroides results. The City of Northville cleaned out the storm drain near West Cady Street in June of 2021. ARC staff resampled NV57-1 and sampled NV57-4 after the drain was cleaned out and found low *E. coli* levels.

Until April of 2021, samples were analyzed by Michigan State University's Department of Fisheries & Wildlife for the *B. theta* marker to determine whether contamination was human in origin. Starting in April of 2021, samples were analyzed by Oakland University's laboratory for the HF183 biomarker to determine whether contamination was human in origin. Both *B. theta* and HF183 are microbial source tracking methods used for identifying if bacteria are from the human intestinal track.

Table 1. Sampling Results

Structure		**NV57-1**	**NV57-2**	**NV57-3E**	**NV57-3N**	**NV57-3**	**NV57-1A**	**NV57-4**
Location		Manhole at corner where Fairbrook St meets 7 Mile Rd	Manhole located in front of 320 and 310 1st St	East inlet to NV57-3	North inlet to NV57-3	Manhole at W Cady St and 1st St	Manhole at the south end of 1st St	Manhole in driveway of 487 W Cady St
E. coli	**6/8/18**	3,876						
E. coli	**8/15/19**	6,131						
E. coli	**7/1/20**	1,012			<10			
Human Biomarker		<354			<354			
E. coli	**8/18/20**	1,137						
Human Biomarker		433,000						
E. coli	**9/15/20**	6,867	<10	<10	<10			
Human Biomarker		<354	<354	47,200	<354			
E. coli	**11/17/20**	1,789	41	41	41			
Human Biomarker		<354	<354	<354	<354			
E. coli	**4/21/21**	14,210						
E. coli	**4/29/21**	6,131	>24,196			143	10,112	
Human Biomarker		113	36,695				<95	
E. coli	**7/28/21**	410						<1

Conclusions and Recommendations

Since *E. coli* can thrive in dark and wet conditions, the excessive amount of sediment in the storm drain along West Cady Street was likely harboring *E. coli* and contributing to the high *E. coli* in the stormwater. Given the inconsistent sample results, buildup of sediment in the storm drain, lack of suspicious connections to the storm drain and lack of sanitary debris, we suspect that the most likely source of the *E. coli* in the sediment was animals and not sewage. Given that there were no obvious signs of animal sources to the drain, ARC Staff recommends monitoring the storm drain for

excessive sediment build up and cleaning it out when build up appears to prevent water quality issues in the stormwater.

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 elevine@ectinc.com.

Attachment: Figure 1. Storm Drain and Sampling Location

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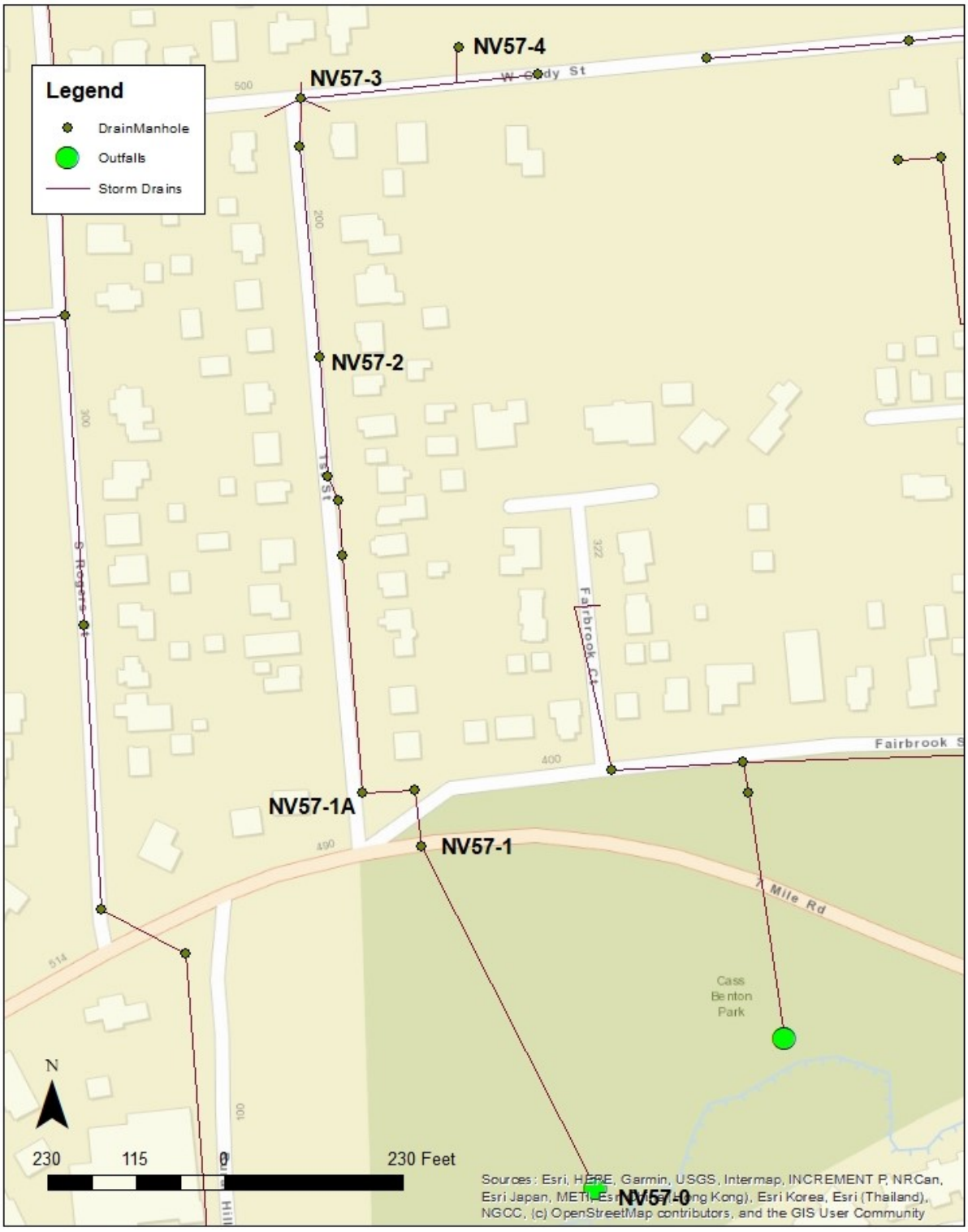
Figure 1. Storm Drain and Sampling Locations



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TO: **Mike Domine, City of Northville**

FROM: **Emily Levine, ARC Staff**

DATE: **August 5, 2021**

SUBJECT: **IDEP Investigation Results: Outfall NV22**

ARC staff conducted an illicit discharge investigation on storm drain outfall NV22 in response to findings from the ARC's 2018 outfall screening and follow-up sampling conducted in 2019 and 2020. Although our investigations did not reveal the source of *E. coli* entering the drain, we do not believe that the source is sewage. Therefore, no further actions are recommended at this time.

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 (Table 1). The outfall was reinspected on July 1 and August 18, 2020 and lower *E. coli* levels were found 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 only found at low levels.

The outfall drains a portion of Allen Drive, Novi Street, and other adjoining streets north of Eight Mile Road. The receiving water is the Walled Lake Branch of the Middle Rouge River (See Figure 1).

Results

ARC staff inspected upstream manholes on April 29, 2021 and found elevated concentrations of *E. coli* and the HF183 human biomarker at manhole NV22-1. Low *E. coli* concentrations were found at manhole NV22-2N, and elevated *E. coli* with low HF183 concentrations (typically indicative of animal sources) were found at manhole NV-22-2.

On May 11, 2021, ARC staff coordinated with the City of Northville to televise all inlet connections to manhole NV22-1. This included televising north from NV22-1 to NV22-1N, east to outfall NV22-0, south to where Allen Drive bends and the storm drain stops, and west to NV22-2. No suspicious connections were identified. Follow-up sampling on June 1, 2021 found low *E. coli* levels. No odors or visual indicators of sewage have been observed during these investigations.

Until April of 2021, human biomarker samples were analyzed by Michigan State University's Department of Fisheries & Wildlife for the *B. theta* marker to determine whether contamination was human in origin. Starting in April of 2021, samples were analyzed by Oakland University's laboratory for the HF183 biomarker to determine whether contamination was human in origin. Both *B. theta* and HF183 are microbial source tracking methods used for identifying if bacteria are from the human intestinal track.

Table 1. Sampling Results

Structure		**NV22-0**	**NV22-1**	**NV22-2**	**NV22-2N**	**NV22-2W-N**	**NV22-2W-W**
Location		Outfall	Manhole in the grass in front of 883 Allen Dr	Manhole in Novi St, south of Hill St	Manhole in the street near 985 Allen Dr	North inlet to NV22-2W	West inlet to NV22-2W
E. coli	**6/7/18**	2,755					
E. coli	**8/15/19**	>24,196					
E. coli	**7/1/20**	108				404	201
Human Biomarker		582				747	
E. coli	**8/18/20**	<10					
Human Biomarker		<354					
E. coli	**4/29/21**		>24,196	10,112	256		
Human Biomarker			24,800	109			
E. coli	**6/1/21**		52			41	

Conclusions and Recommendations

Based on the data collected and investigations conducted to date, we suspect that the source of the high *E. coli* was from animal feces, rather than from sewage. This determination is made because the high *E. coli* levels generally coincided with low Human Bacteroides levels which indicates that the *E. coli* is not from a human source. In addition, no identifiable illicit connections have been found after a thorough investigation of this storm drain system and no signs of sanitary debris were found in the storm drain. Given that there were no obvious signs of animal sources to the drain or identifiable illicit connections, 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 elevine@ect.com.

Attachment: Figure 1. Storm Drain and Sampling Locations

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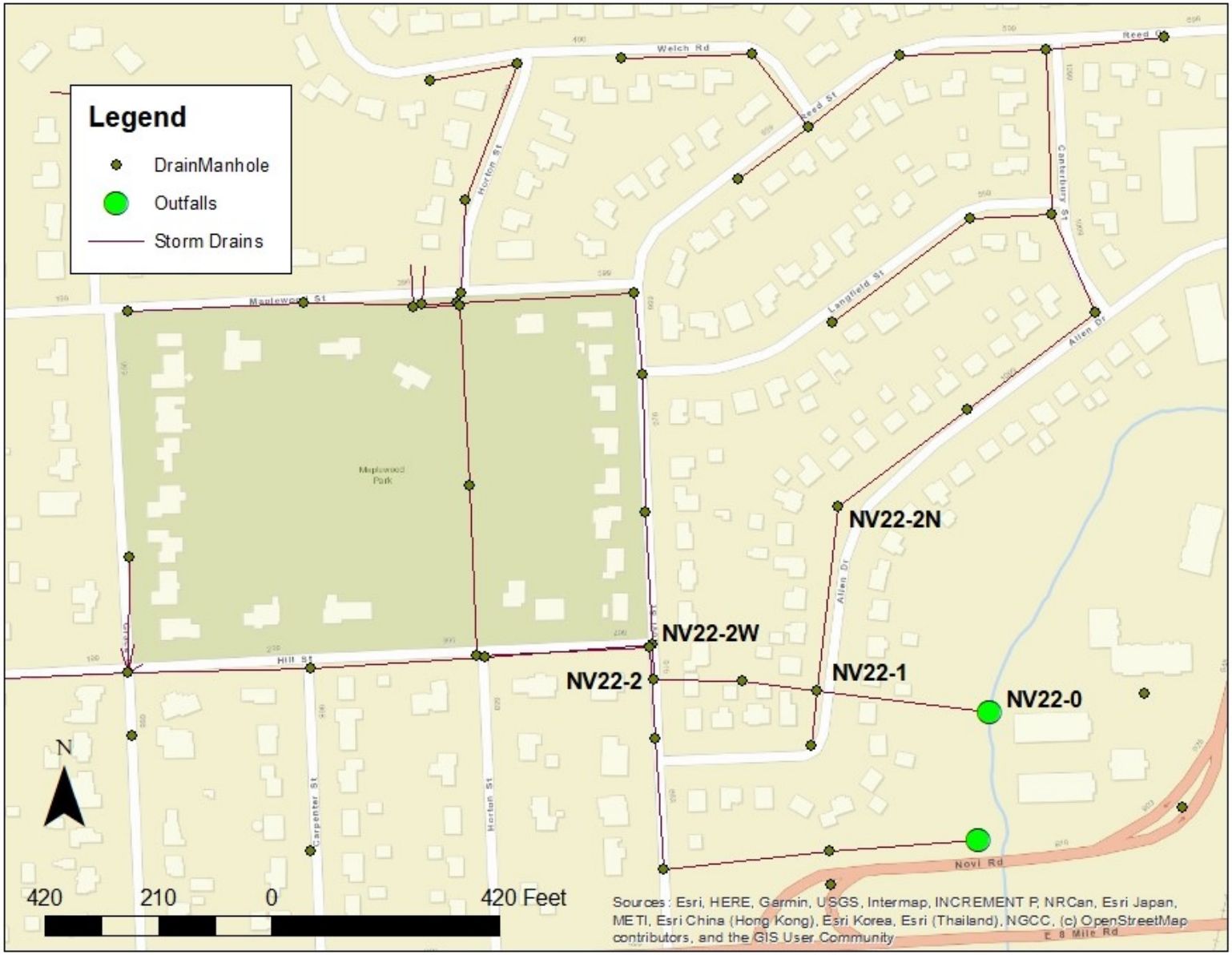
Figure 1. Storm Drain and Sampling Locations



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TO: **Kevin Lawrence, Village of Beverly Hills Director of Public Services**

FROM: **Emily Levine, ARC Staff**

DATE: **August 5, 2021**

SUBJECT: **IDEP Investigation Results: Outfall BV51 (Sleepy Hollow Lane)**

ARC staff continued illicit discharge investigation on storm drain outfall BV51 in response to findings from the 2018 outfall screening and 2019 and 2020 investigations. Our investigations did not reveal the source of *E. coli* entering the drain; therefore, we will continue investigations in 2022.

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.

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.

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).

Results

Based on sampling results from previous inspections, ARC staff coordinated with the Oakland County Water Resource Commissioner (OCWRC) to televise the drain west of Outfall BV51 on May 19, 2021. Only the west line was televised because flow had not been observed coming from the north and south during dry weather. A tap was identified in the storm drain that was believed to be a possible illicit connection, although no staining or evidence of sewage was observed (Figure 2). Based on the pipe's location and direction, it appeared to be coming from the house at 31349 Sleepy Hollow Lane. On July 23, 2021, ARC staff coordinated with the Village of Beverly Hills to dye test 31349 Sleepy Hollow Lane. The dye testing revealed that all three bathrooms in the house were correctly connected to the sanitary drain and no dye was observed entering the storm drain.

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

	E. coli	***E. coli***	***E. coli***	***E. coli***	***E. coli***	**Human *Bacteroides***	***E. coli***	**Human *Bacteroides***
	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

Work to date indicates that there is not an illicit connection downstream of BV51-1. However, the data suggests that upstream illicit connections may exist. Therefore, ARC staff recommends resampling the outlet up to two more times in 2022 for both *E. coli* and *Bacteroides* (only if the E. coli is elevated). If another set of high *E. coli* and *Bacteroides* results are found, we suggest televising the drain upstream of BV51-1 to determine if any suspicious connections are found. If so, dye testing should be performed to determine the nature of the connection. If another set of high *E. coli* and *Bacteroides* results are not found, we recommend closing out the investigation.

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 313-963-6600 or elevine@ectinc.com.

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Figure 1. Storm Drain and Sampling Locations

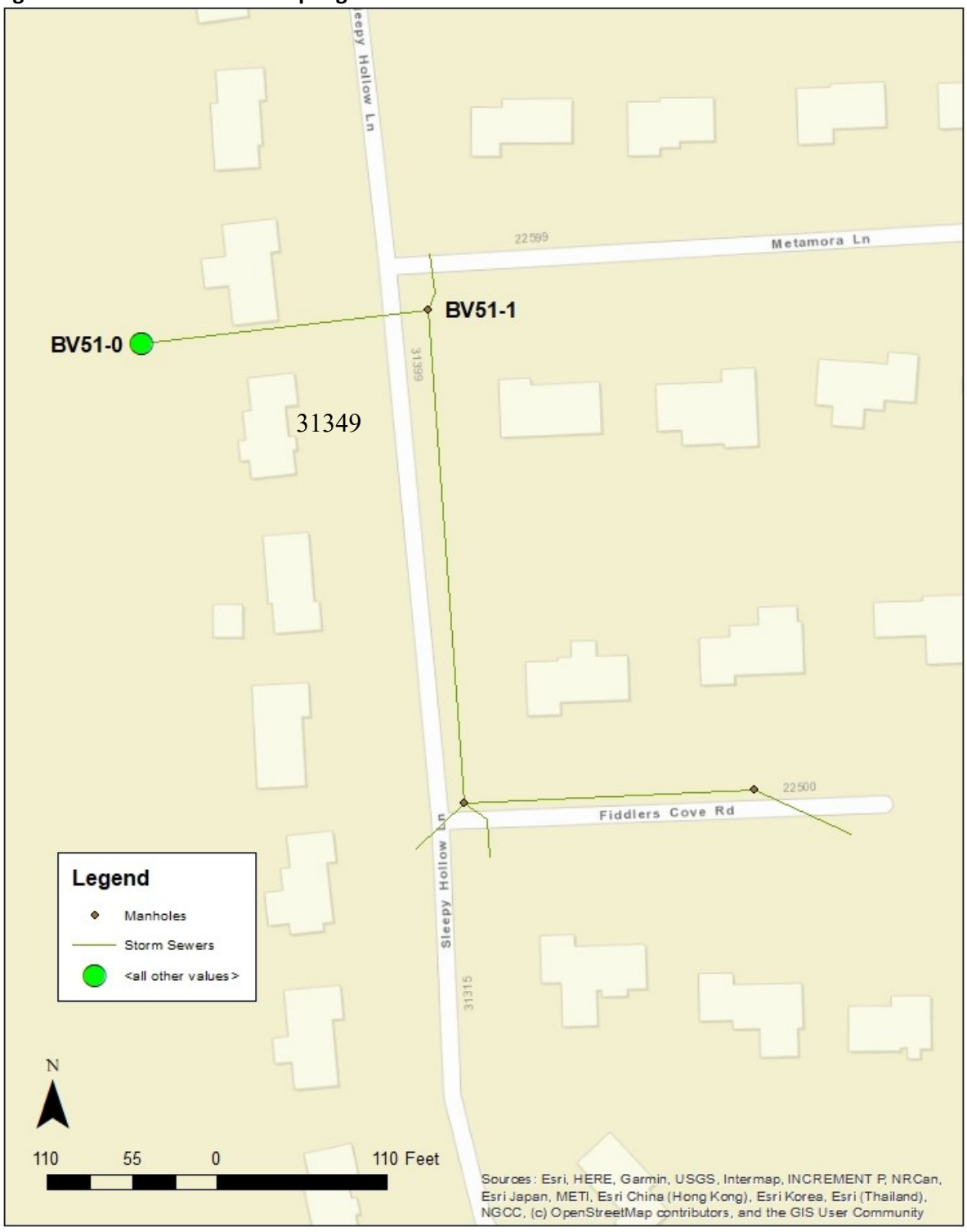

Figure 2. Tap to Storm Drain at 14.2 ft east of BV51-0