MEMO

To:
Tianna Kilgore, EGLE

Copies:
Grant Trigger, RACER

Arcadis of Michigan, LLC
28550 Cabot Drive
Suite 500
Novi
Michigan 48377
Tel 248 994 2240
Fax 248 994 2241

From:
Buick City Team

Date:
March 10, 2023

Arcadis Project No.:
30121887

Subject:
Industrial Avenue Proposed Monitoring Well Abandonment
RACER, Buick City, Flint, Michigan

To facilitate redevelopment activities at the RACER Buick City Site (Site), monitoring wells at the Site are being evaluated and those not planned to be used for future groundwater monitoring activities are being proposed to be abandoned.

WELL ABANDONMENT RATIONALE

Two dual-nested temporary monitoring wells (SB-04-95 and SB-04-96) were installed in the former Industrial Avenue in 2021 (**Figure 1**). The wells were installed to investigate for the possible presence of PFAS in groundwater and were not intended for long-term groundwater monitoring purposes. This portion of the road will be removed in preparation for redevelopment activities and the monitoring wells need to be abandoned to prevent vertical migration of surface water or shallow impacts.

Prior to abandonment, the temporary wells will be sampled a final time for poly- and perfluorinated alkyl substances (PFAS). Additionally, some temporary wells located east of SB-04-05 and SB-04-96 will also be sampled to evaluate current conditions and assess the need to re-install monitoring wells near this location in the future. The boring logs are provided in **Attachment A.**

The attached Temporary Well Abandonment Flowchart (**Figure 2**) was used to evaluate the appropriate abandonment method. Although the shallow temporary wells can be abandoned by removing the well casing , because the wells are dual-nested, removal of the casing in the shallow wells may compromise the integrity of the seal between the wells and the surface seal. Therefore, all of the wells will be

abandoned by the modified plug-in-place method as shown on the Flowchart (**Figure 2**). The modified plug-in-place method is described below.

MODIFIED PLUG IN PLACE WELL ABANDONMENT PROCEDURE

The modified plug-in-place well abandonment procedure will be as follows:

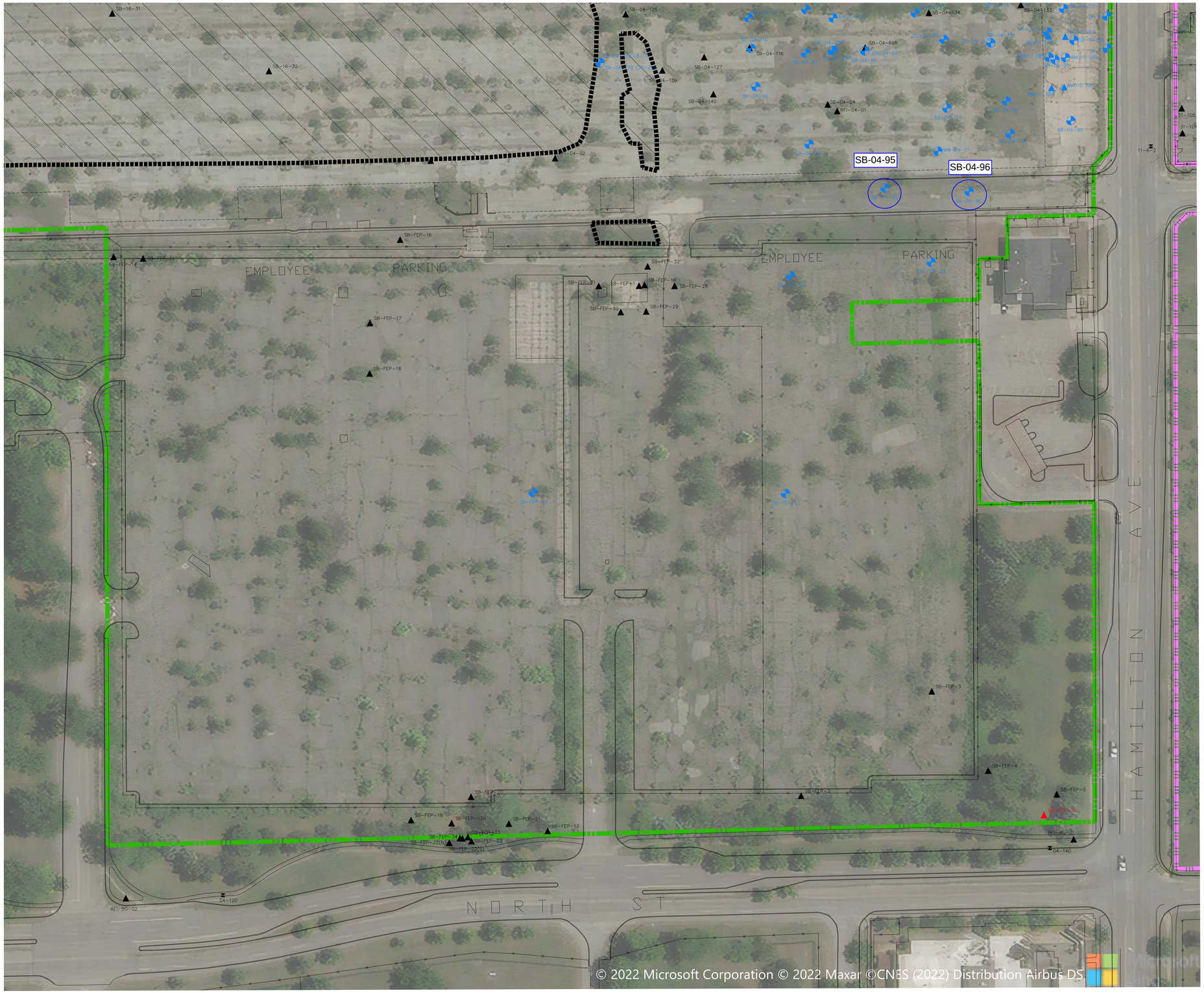
1. Locate the monitoring well in the field.
2. Conduct total depth measurements and water level measurements.
3. Calculate the volume of the well that will need to be filled utilizing field measurements; and
4. Record all observations and measurements.
5. Perforate the base of the well screen utilizing a length of drilling rod or other equipment, to allow the grout seal to penetrate the surrounding filter pack.
6. Prepare a neat cement grout or bentonite cement grout.
7. Place the grout in the perforated well casing via the tremie method (i.e., the grout will be pumped from the bottom of the well upward). The grout will be added until the well is filled to above the top of the well casing at grade. Verify that the amount of grout added equals or exceeds the calculated volume of the void to be filled.
8. Check for settlement of the grout and top off the grout, as necessary.
9. A well abandonment log will be completed for each well.

Enclosures:

Figure 1 –Temporary Well Locations

Figure 2 – Temporary Well Abandonment Flow Chart

Attachment A – Industrial Avenue Soil Boring Logs



LEGEND:

- SOIL BORING
- ABANDONED MONITORING WELL
- MONITORING WELL (ACTIVE)

0 60' 120'
APPROXIMATE SCALE IN FEET

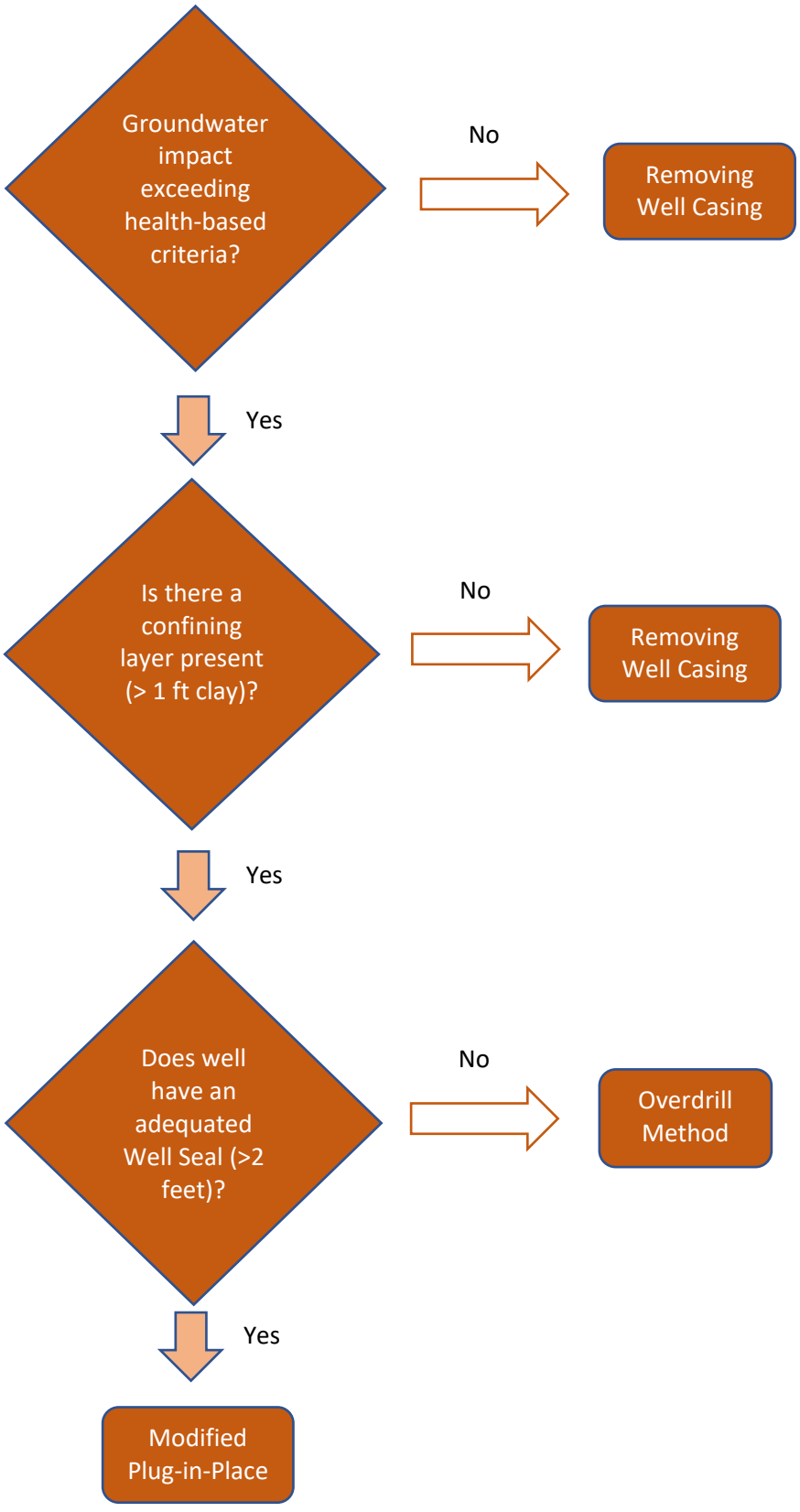
RACER TRUST
BUICK CITY
FLINT, MICHIGAN

INDUSTRIAL AVENUE WELL ABANDONMENT LOCATIONS

ARCADIS Design & Consultancy for natural and built assets

FIGURE 1

Figure 2 - Temporary Well Abandonment Flow Chart
RACER Buick City, Flint, Michigan



Attachment A

BORING LOGS

ARCADIS Design & Consultancy for natural and built assets

Boring No.: SB-04-95

Soil Boring Log

Sheet: 1 of 2

Project Name: RACER Trust - Buick City
Project Number: 30075935
Project Location: Flint, MI

Date Started: 02/03/2021
Date Completed: 02/03/2021

Logger: E. Redner
Editor: M. Humphrey
Weather Conditions: 26°F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					0.0		(0.0-1.0') CONCRETE.	(0.0-3.0' bgs) Bentonite	
2				SB-04-95(1-2) _020321 @ 1435	0.0		(1.0-2.5') SAND, very fine to coarse, subangular to rounded; little very coarse sand to large pebbles, subangular to rounded; poorly sorted; dry; very dark brown (10YR 2/2). Note: Color change to yellowish brown (10YR 5/6) at 1.5' bgs.	(0.0-4.0' bgs) 1" Sch 40 PVC Well Casing	
3					0.0				
4			65		0.0		(2.5-6.5') SAND, very fine to fine; little to some silt; little medium sand to granules, subangular to rounded; well sorted; moist; yellowish brown (10YR 5/6).		
5				SB-04-95(4-5) _020321 @ 1440	0.0		Note: Wet from 5.0-6.5' bgs.		
6					0.0			(4.0-9.0' bgs) 1" PVC 10-Slot Well Screen	
7					0.0		(6.5-17.0') CLAY; little silt, medium to high plasticity, slow dilatancy; trace very fine sand to small pebbles, subangular to rounded; dry to moist; soft to hard; gray (10YR 5/1).		
8					0.0				
9					0.0				
10				SB-04-95(9-10) _020321 @ 1445	0.0			(3.0-11.0' bgs) Filter Pack Sand	
11					0.0				
12			120		0.0		Note: Very compact from 12.0-17.0' bgs.	(11.0-15.0' bgs) Bentonite	
13					0.0				
14					0.0				
15				SB-04-95(14-15) _020321 @ 1455	0.0				
16					0.0			(15.0-24.0' bgs) Filter Pack Sand	
17					0.0				
18				SB-04-95(16-18) _020321 @ 1500	0.0		(17.0-19.0') SILT; trace clay, nonplastic, rapid dilatancy; and SAND, very fine to fine; trace medium sand to granules, subangular to rounded; moist to wet; soft to medium stiff; gray (10YR 6/1). Note: Wet at 18.0-21.5' bgs.	(17.0-22.0' bgs) 1" PVC 10-Slot Well Screen	
19					0.0				
20					0.0		(19.0-22.0') SAND, very fine to fine; little to some silt; trace medium sand to medium pebbles, subangular to rounded; well sorted; moist to wet; gray (10YR 6/1).		

Drilling Co.: Cascade
Driller: J. Lary
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: bgs = below ground surface; NA = not applicable; btoc = below top of casing; ft = feet. Hand augering to 5' bgs was not possible due to concrete. Temporary wells were installed between 4-9' and 17-22' bgs.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): 5.0
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 734.96
North Coor: 560573.82
East Coor: 13304998.43

SOIL BORING LOG_2013 C:\USERS\MHUMPHREY\DESKTOP\NEW BUICK CITY LOGS\BUICK CITY 2019 - 2021 LOGS_V2.GPJ ARCADIS_2013.GDT 1/18/23

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Soil Boring Log

Boring No.: SB-04-95

Sheet: 2 of 2

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Logger: E. Redner
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Weather Conditions: 26°F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(19.0-22.0') SAND, very fine to fine; little to some silt; trace medium sand to medium pebbles, subangular to rounded; well sorted; moist to wet; gray (10YR 6/1).	(0.0-24.0' bgs) 1" Sch 40 PVC Well Casing	
22			120		0.0				
23					0.0		(22.0-23.5') CLAY; some silt, low to medium plasticity, rapid dilatancy; some very fine sand to very large pebbles, subangular to rounded; dry to moist; stiff to hard; gray (10YR 5/1).		
24					0.0		(23.5-24.0') SAND, fine to coarse, subangular to rounded; little very coarse sand to medium pebbles, subangular to rounded; poorly sorted; wet; gray (10YR 5/1). Note: Wet from 23.5-24.0' bgs.		
25				SB-04-95(24-25) _020231 @ 1505	0.0		(24.0-27.0') CLAY; some silt, low to medium plasticity, rapid dilatancy; some very fine sand to very large pebbles, subangular to rounded; dry to moist; stiff to hard; gray (10YR 5/1).		
26					0.0			(24.0-27.0' bgs) Bentonite	
27					0.0				
28							End of boring at 27.0' bgs.		
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
41									

Remarks:

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Boring No.: SB-04-96

Soil Boring Log

Sheet: 1 of 2

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Project Number: 30075935
Project Location: Flint, MI

Date Started: 02/03/2021
Date Completed: 02/03/2021

Logger: E. Redner
Editor: M. Humphrey
Weather Conditions: 30°F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					0.0		(0.0-2.0') CONCRETE.	(0.0-3.0' bgs) Bentonite	
2					0.0			(0.0-4.0' bgs) 1" Sch 40 PVC Well Casing	
3				SB-04-96(2-3) _020321 @ 1635	0.0		(2.0-5.5') FILL: SAND, very fine to coarse, subangular to rounded; little very coarse sand to large pebbles, subangular to rounded; poorly sorted; dry to moist; dark brown (10YR 3/3) to yellowish brown (10YR 5/6).		
4			70		0.0		Note: 2" piece of cement slab observed at 3.5' bgs.		
5				SB-04-96(4.5-5) _020321 @ 1640	0.0				
6					0.0		(5.5-6.5') SAND, very fine to fine; little silt; well sorted; wet; yellowish brown (10YR 5/6). Note: Wet from 5.5-6.5' bgs.	(4.0-9.0' bgs) 1" PVC 10-Slot Well Screen	
7					0.0		(6.5-17.0') CLAY; some to little silt, high plasticity, slow dilatancy; trace very fine to sand to large pebbles, subangular to rounded; moist; soft to hard; gray (10YR 6/1) to gray (10YR 5/1).		
8					0.0				
9				SB-04-96(9-10) _020321 @ 1645	0.0			(3.0-11.0' bgs) Filter Pack Sand	
10					0.0				
11					0.0		Note: Large cobble encountered at 11.0' bgs.		
12			120		0.0				
13					0.0				
14				SB-04-96(14-15) _020321 @ 1650	0.0			(11.0-17.0' bgs) Bentonite	
15					0.0				
16					0.0				
17					0.0				
18					0.0		(17.0-20.0') SILT; some very fine sand; trace fine sand to small pebbles, subangular to rounded; very moist; medium stiff; gray (10YR 6/1).	(17.0-25.0' bgs) Filter Pack Sand	
19				SB-04-96(19-21) _020321 @ 1705	0.0				
20					0.0				

Drilling Co.: Cascade
Driller: J. Lary
Drilling Method: Sonic Drilling
Drilling Fluid: Water
Remarks: bgs = below ground surface; NA = not applicable; btoc = below top of casing; ft = feet. Hand augering to 5' bgs was not possible due to concrete. Temporary wells were installed between 4-9' and 19-24' bgs.

Sampling Method: Core Barrel
Sampling Interval: Continuous
Water Level Start (ft. bgs.): 5.5
Water Level Finish (ft. btoc.): NA
Converted to Well: ☒ Yes ☐ No
Surface Elev.: 734.42
North Coor: 560470.84
East Coor: 13304994.01

SOIL BORING LOG_2013 C:\USERS\MHUMPHREY\DESKTOP\NEW BUICK CITY LOGS\BUICK CITY 2019 - 2021 LOGS_V2.GPJ ARCADIS_2013.GDT 1/18/23

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Weather Conditions: 30°F, Sunny

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
21					0.0		(20.0-24.0') SAND, very fine to fine; some silt; some medium sand to large pebbles, subangular to rounded; well sorted; moist to wet; gray (10YR 6/1). Note: Wet from 21.0-24.0' bgs.	(0.0-24.0' bgs) 1" Sch 40 PVC Well Casing (19.0-24.0' bgs) 1" PVC 10-Slot Well Screen	
22			120		0.0				
23					0.0				
24					0.0				
25				SB-04-96(24-25) _020321 @ 1710	0.0		(24.0-27.0') CLAY; and SILT, low to medium plasticity, rapid dilatancy; little to trace very fine sand to medium pebbles, subangular to rounded; moist; hard; gray (10YR 5/1).		
26					0.0			(25.0-27.0' bgs) Bentonite	
27					0.0				
28							End of boring at 27.0' bgs.		
29									
30									
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40									
41									

Remarks: