WELL, WELL – SECURING FUTURE DISPOSAL CAPACITY AT THE WEST ISLAND WWTF

Presented by:
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NEWEA Annual Conference – February 2, 2021

Stantec

PRESENTATION OUTLINE

- West Island WWTF History
- Disposal Well Area – Description & Operation
- Borings – April 2019
- Disposal Well #6 Installation
- Borings – January 2020
- Disposal Well #7 Installation

WEST ISLAND WWTF HISTORY

LOCATON PLAN

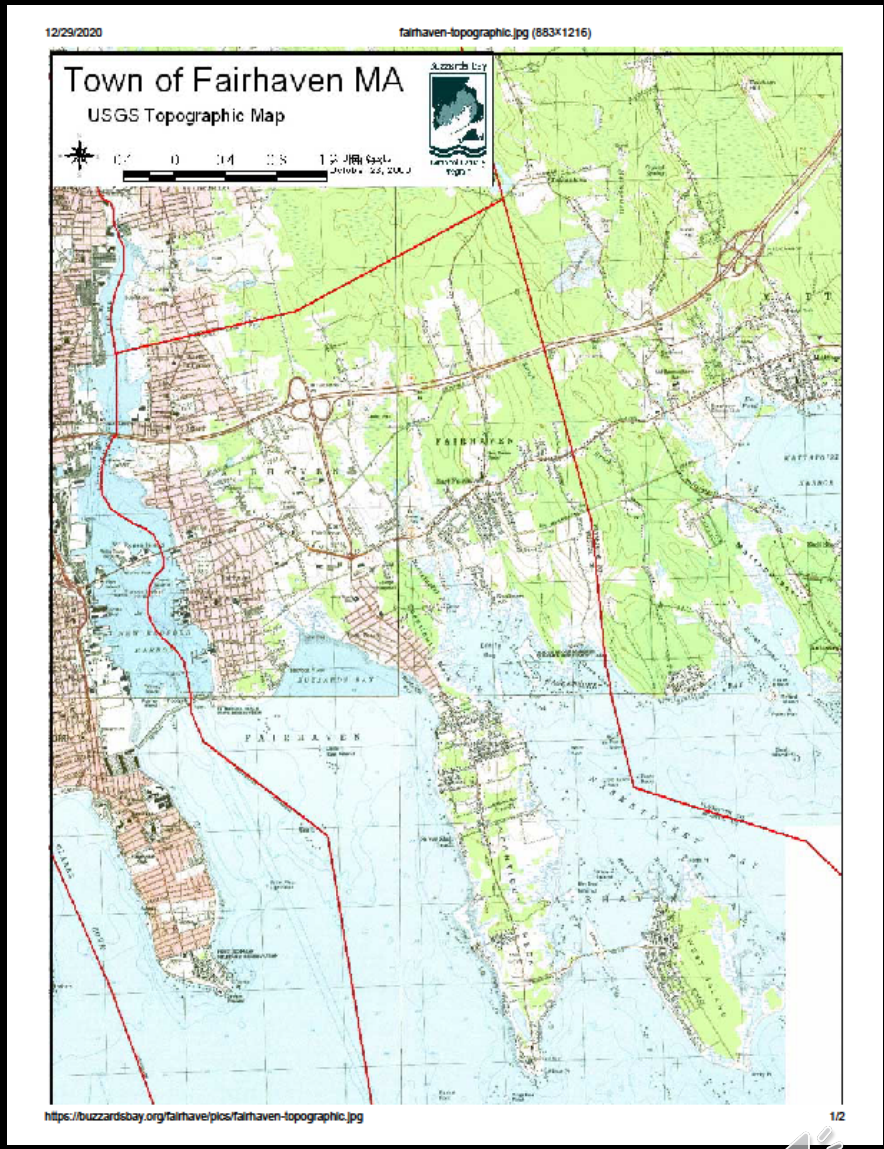
West Island – Part of Fairhaven, MA

Southeastern MA Community

Located on Buzzards Bay

West Island in Southeastern Corner of Town

Fairhaven Main WWTF in Central Part of Town



Map Courtesy of BuzzadsBay.org

West Island WWTF

Built Late 1990s – Town's 2nd Municipal WWTF

Tertiary Treatment

2 Aerobic & 2 Anoxic Rotating Biological Contactors

Rapid Sand Filter

Ultraviolet Disinfection

Final Effluent Discharge to Disposal Wells

Groundwater Discharge Permit

Max. Daily Flow	100,000 gpd
Avg. Daily Flow	80,000 gpd
TSS	30 mg/L
BOD_5	30 mg/L
Total Nitrogen	10 mg/L
Nitrate Nitrogen	10 mg/L
Fecal Coliform	200/100 mL

DISPOSAL WELL AREA – DESCRIPTION & OPERATION

Disposal Well Area Location

Located About 2,100’ from WWTF Site

Wooded Area near Salt-Water Marsh

Effluent Pumped to Site via 4” Force Main

Disposal Well Area Geology

Glacial Till from Ground Surface to Permeable Layer

Permeable Layer About 2′ – 5′ Thick

Permeable Layer at Varying Depths

- 23′ – 32′ Depth Generally

Bedrock Below Permeable Layer

Disposal Well Description

12” Diameter Well 30’ - 40’ Deep

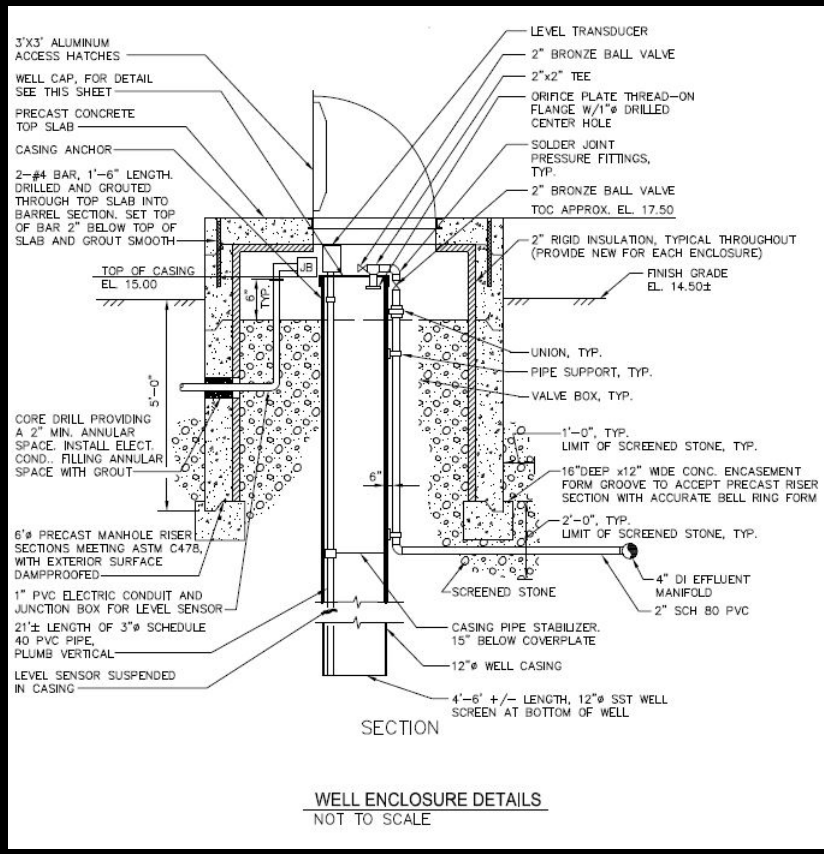
Well Screen at Permeable Soil Layer

Concrete Well Cap

Access Hatch

Force Main Extended to Well

Surface Water Level Sensor



Disposal Well Operation

Historically, 3 – 4 Wells Online

1 Well Used at a Time

Wells Rotated Every 30 – 45 Days

Well Taken Off-line, Brush-cleaned, Disinfected

New Disposal Well Need

In 2019, Only 2 Wells Operating at Full Capacity – Wells #3 & #4

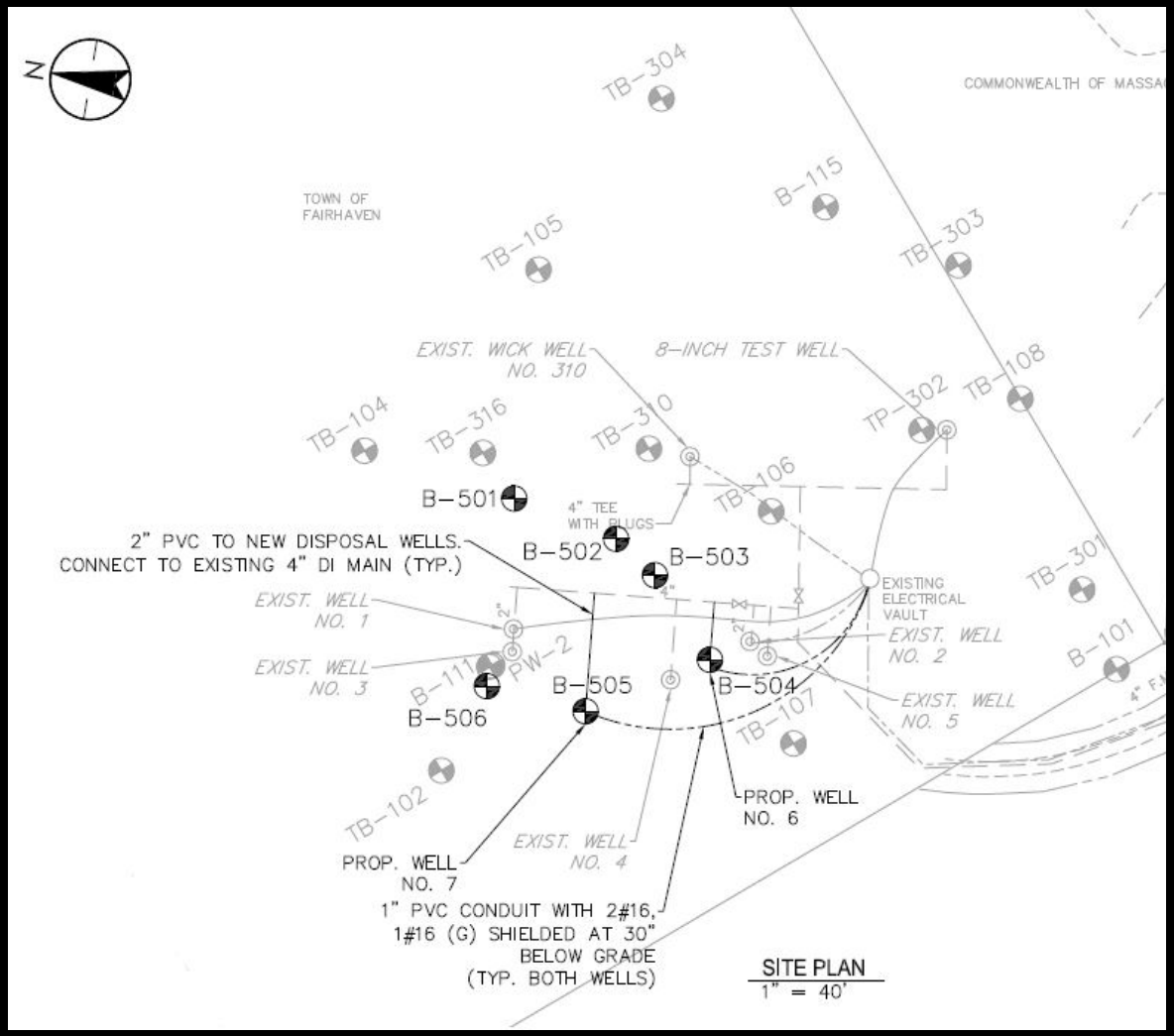
Well Screen/Adjacent Area Loses Capacity Over Time

Well Cleaning Ineffective

Town Decided to Add 2 New Wells – Wells #6 & #7

BORINGS – APRIL 2019

6 Rotosonic Borings Installed April 2019



Rotosonic Borings

Drill Rod, Core Barrel, and Casing Rotated at Sonic Frequencies

Low Impact Technology

Undisturbed Core Samples Produced

Sieve Analysis of Core Samples

Two Locations Identified for New Well Installation – B-504 & B-505

DISPOSAL WELL #6 INSTALLATION

Well #6 Drilling

18” Steel Outer Casing Installed 10.10.19 for Well #6

Soil Sampling at Permeable Layer 27.5’ – 31.5’

Casing Drilled to Bedrock – 31.5’

Sieve Analysis of Soil Samples

Well Screen Height/Slot Size Determined

Well Screen Ordered

Well #7 Drilling

18” Steel Outer Casing Installed 10.11.19 and10.14.19 for Well #7

Soil Sampling at Permeable Layer 30.5’ – 32’

Casing Drilled to Bedrock – 32’

Sieve Analysis of Soil Samples

Investigate Other Locations Due to Narrow Permeable Layer

Well #6 Screen Installation

12” Steel Inner Casing with Screen Installed 11.13.19 for Well #6

0.140” Screen at 28’ – 32’

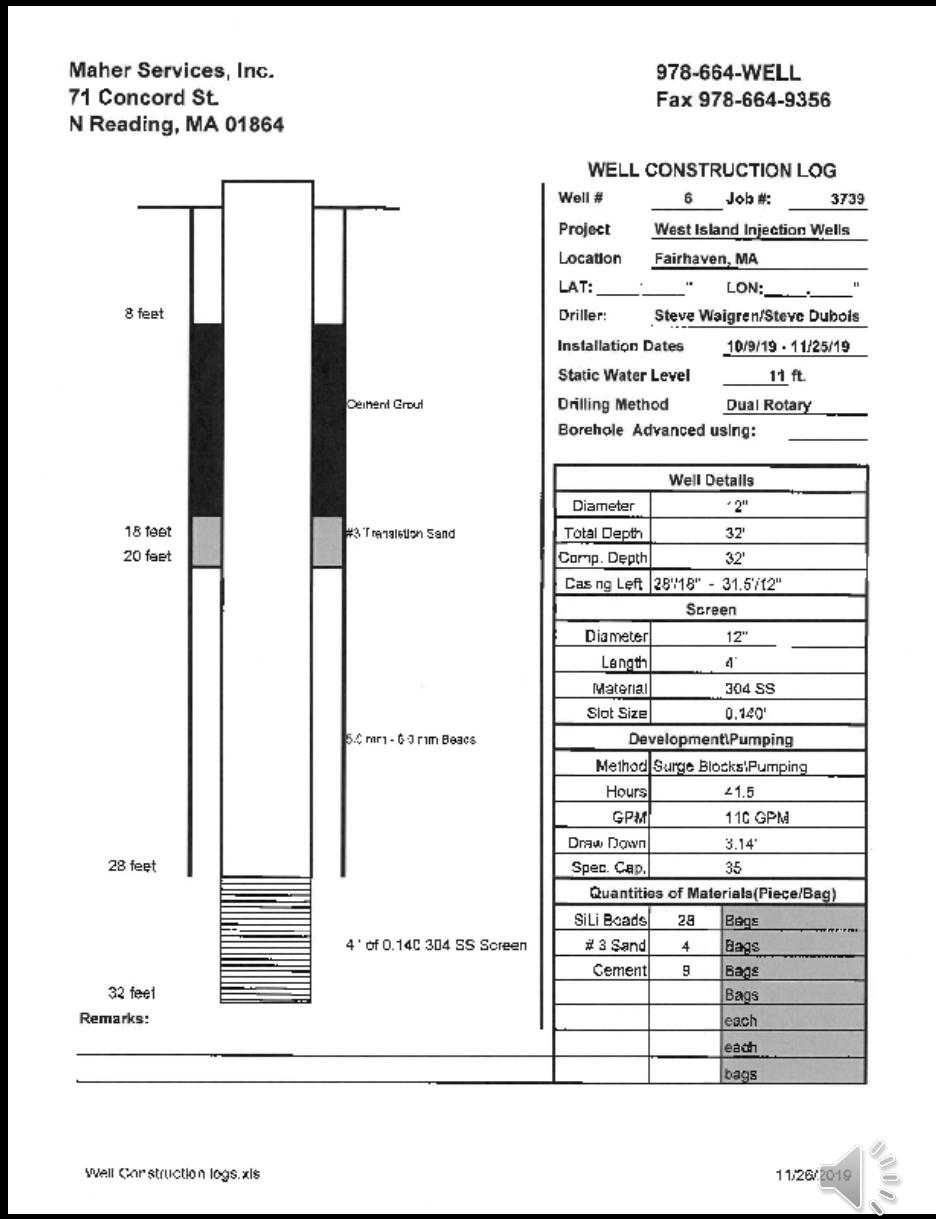
5 mm – 6 mm Glass Beads in Annular Space at 20’ – 32’ in Place of Silica Gravel Pack

Sand and Bentonite Grout above Beads

18” Steel Outer Casing Pulled to Top of Screen at 28’ and Cut at Grade

Well #6 Development

- Well Developed by Pumping and Surging
- Pumping Rates up to 110 gpm over 41.5 Hours; 100 gpm in Spec
- Specific Capacity 35 gpm/ft during Development
- Clean Discharge – Sand Content 2 ppm in Spec
- 8-Hour Injection Test – Overall Specific Capacity 23.69 gpm/ft



Maher Services, Inc.
71 Concord St.
N Reading, MA 01864

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WELL CONSTRUCTION LOG

Well # 6 Job #: 3739
Project West Island Injection Wells
Location Fairhaven, MA
LAT: ___ ___ " LON: ___ ___ "
Driller: Steve Waigren/Steve Dubois
Installation Dates 10/9/19 - 11/25/19
Static Water Level 11 ft.
Drilling Method Dual Rotary
Borehole Advanced using:

Well Details	
Diameter	12"
Total Depth	32'
Comp. Depth	32'
Casing Left	25'/18" - 31.5'/12"
Screen	
Diameter	12"
Length	4'
Material	304 SS
Slot Size	0.140'
Development\Pumping	
Method	Surge Blocks\Pumping
Hours	41.5
GPM	110 GPM
Draw Down	3.14'
Spec. Cap.	35
Quantities of Materials(Piece/Bag)	
SiLi Beads	28 Bags
# 3 Sand	4 Bags
Cement	9 Bags
	Bags
	each
	each
	bags

8 feet
18 feet
20 feet
28 feet
32 feet
Cement Grout
#3 Transition Sand
5.0 mm - 6.0 mm Beads
4' of 0.140 304 SS Screen
Remarks:

Well Construction logs.xls
11/26/2019

Well #6 Completion/Startup

Town Completed Civil/Site/Electrical/Instrumentation

- Concrete Cap
- Access Hatch
- Force Main Extension
- Electrical Conduit
- Level Sensor/Instrumentation

Well Startup 1.10.20

- Partial Flow 1st Week
- Full Flow After 1st Week
- Surface Water Level Increase OK

BORINGS – JANUARY 2020

Additional Borings – January 2020

3 Days of Borings

Searching for Thicker Permeable Layer for Well #7

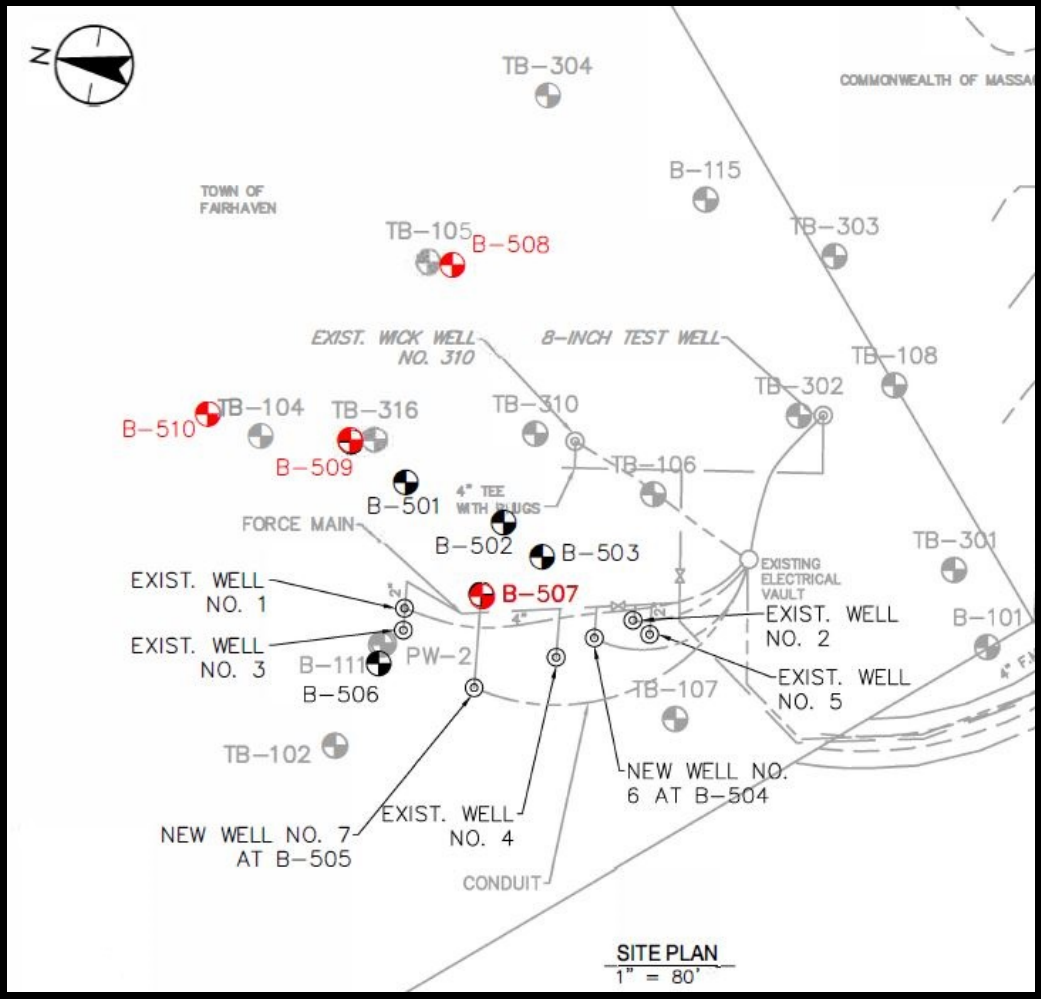
4 Borings Installed – Thicker Permeable Layers Observed

Monitoring Wells (MWs) Installed at 3 Borings

- 5’ of 4” SS Screen
- 4” PVC Riser Pipe

Sieve Analyses of Permeable Layers

Additional Boring Locations – January 2020



Monitoring Well Development/Testing Late Jan./Early Feb. 2020

Pumping and Surging

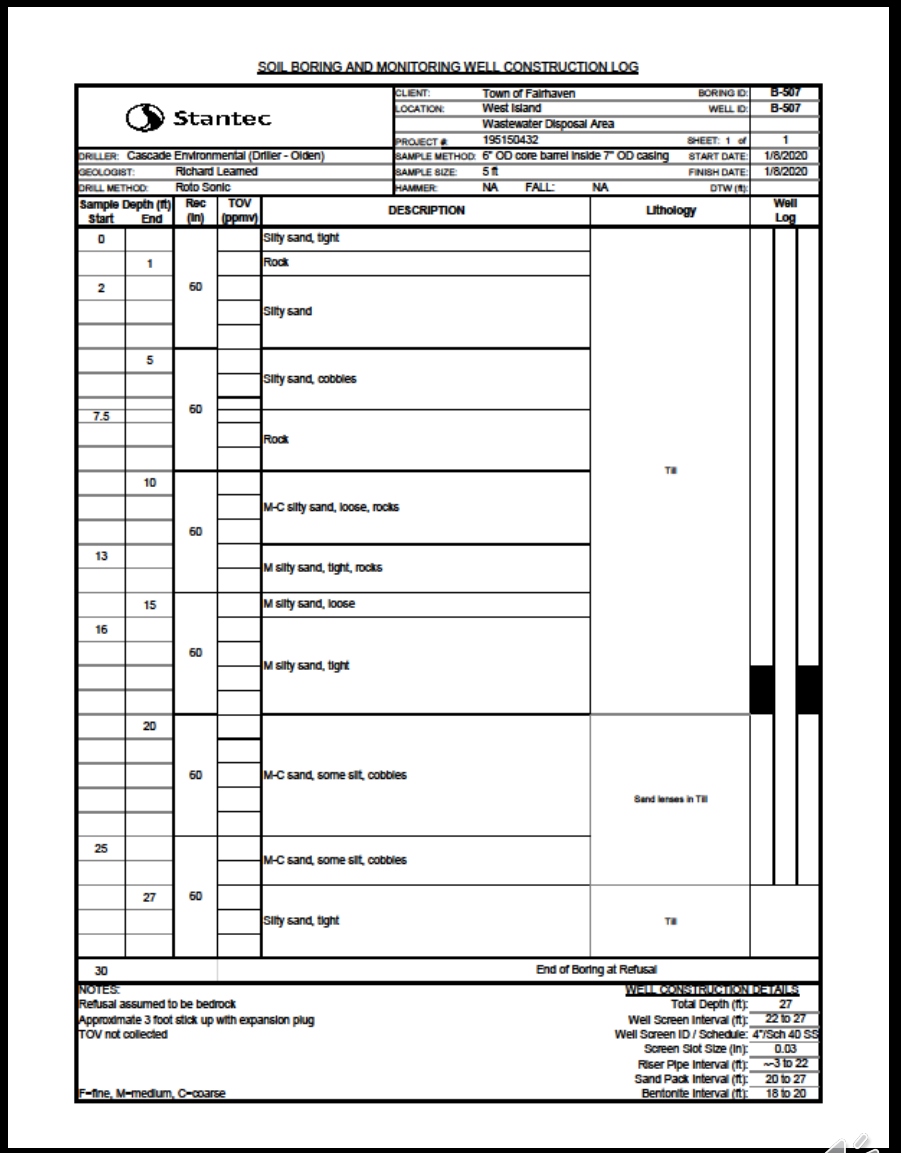
Looking for 20 - 40 gpm from Each MW

3 MWs Investigated

Visual Assessment of Samples Eliminated 4th MW

< 20 gpm Pumped into MWs Before Backing Up

Back to the Drawing Board!



SOIL BORING AND MONITORING WELL CONSTRUCTION LOG

Stantec

CLIENT:	Town of Fairhaven	BORING ID:	B-507
LOCATION:	West Island Wastewater Disposal Area	WELL ID:	B-507
PROJECT #:	195150432	SHEET:	1 of 1
DRILLER:	Cascade Environmental (Driller - Olden)	SAMPLE METHOD:	6" OD core barrel inside 7" OD casing
GEOLOGIST:	Richard Leamed	SAMPLE SIZE:	5 ft
DRILL METHOD:	Roto Sonic	HAMMER:	NA FALL: NA
START DATE:	1/8/2020	FINISH DATE:	1/8/2020
DTW (ft):			

Sample Depth (ft) Start	End	Rec (in)	TOV (ppmv)	DESCRIPTION	Lithology	Well Log
0				Silty sand, tight		
	1			Rock		
2		60		Silty sand		
	5			Silty sand, cobbles		
7.5		60		Rock		
	10			M-C silty sand, loose, rocks	Till	
13		60		M silty sand, tight, rocks		
	15			M silty sand, loose		
16		60		M silty sand, tight		
	20			M-C sand, some silt, cobbles	Sand lenses in Till	
25		60		M-C sand, some silt, cobbles		
	27			Silty sand, tight	Till	
30				End of Boring at Refusal		

NOTES:
Refusal assumed to be bedrock
Approximate 3 foot stick up with expansion plug
TOV not collected

F=fine, M=medium, C=coarse

WELL CONSTRUCTION DETAILS:

Total Depth (ft):	27
Well Screen Interval (ft):	22 to 27
Well Screen ID / Schedule:	4"/Sch 40 SS
Screen Slot Size (in):	0.03
Riser Pipe Interval (ft):	~3 to 22
Sand Pack Interval (ft):	20 to 27
Bentonite Interval (ft):	18 to 20

DISPOSAL WELL #7 INSTALLATION

Return to Original Site for Well #7?

Near Existing Operating Wells #3 & #4, and New Well #6

New Well #6 Operation

- Still Going Strong – Jan. to Mar. 2020
- Water Level 7’ Below Ground

20 gpm Pumped Out of 18” Casing for Well #7 (Casing Pulled up out of Bedrock)

Collaborative Decision - Return to Original Site for New Well #7

Well #7 Screen Installation

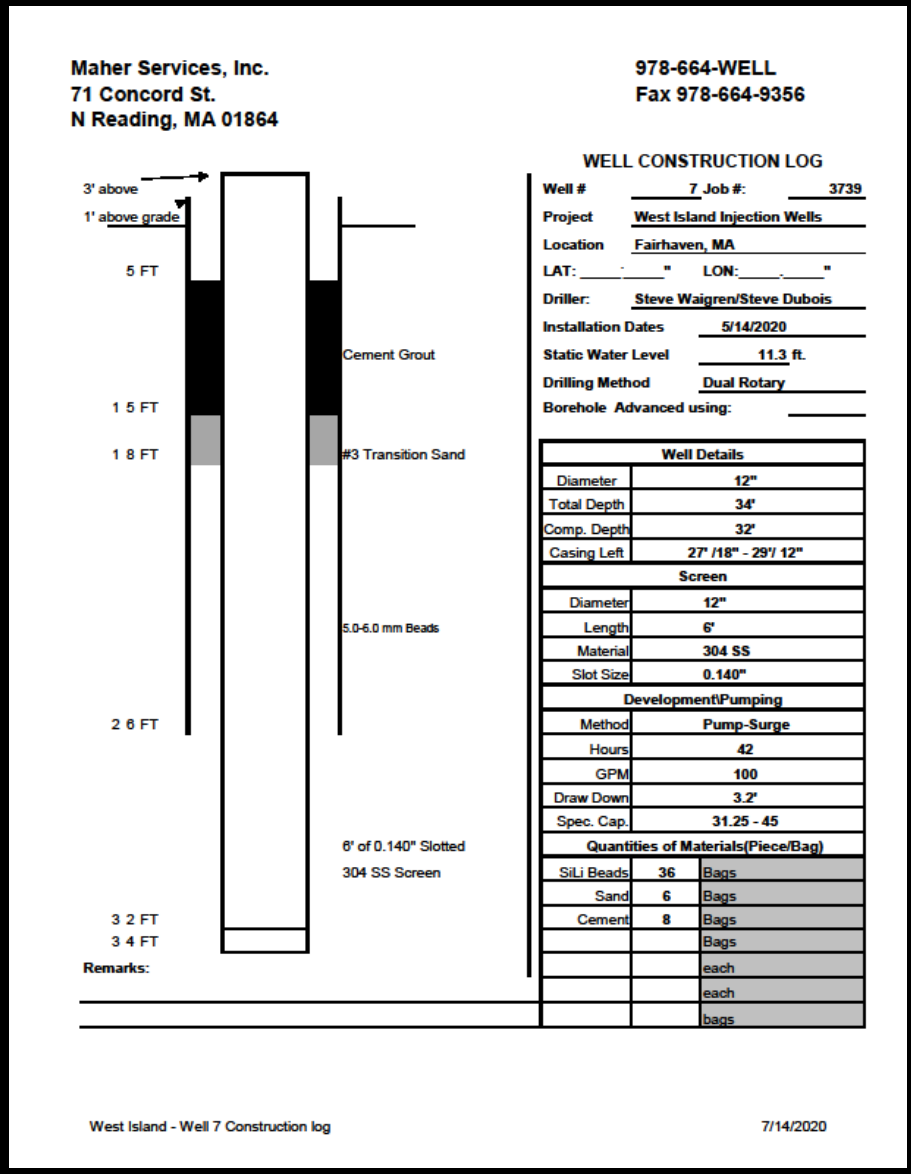
12” Steel Inner Casing with Screen Installed 5.8.20

0.140” Screen at 26’ – 32’

Longer Screen to Cover Permeable Layers Seen in April 2019 Borings

5 mm – 6 mm Glass Beads in Annular Space at 18’ – 32’

18” Steel Outer Casing Pulled to Top of Screen at 26’ and Cut 1’ Above Grade



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WELL CONSTRUCTION LOG

Well # 7 Job #: 3739
Project West Island Injection Wells
Location Fairhaven, MA
LAT: ____-____" LON: ____-____"
Driller: Steve Waigren/Steve Dubois
Installation Dates 5/14/2020
Static Water Level 11.3 ft.
Drilling Method Dual Rotary
Borehole Advanced using:

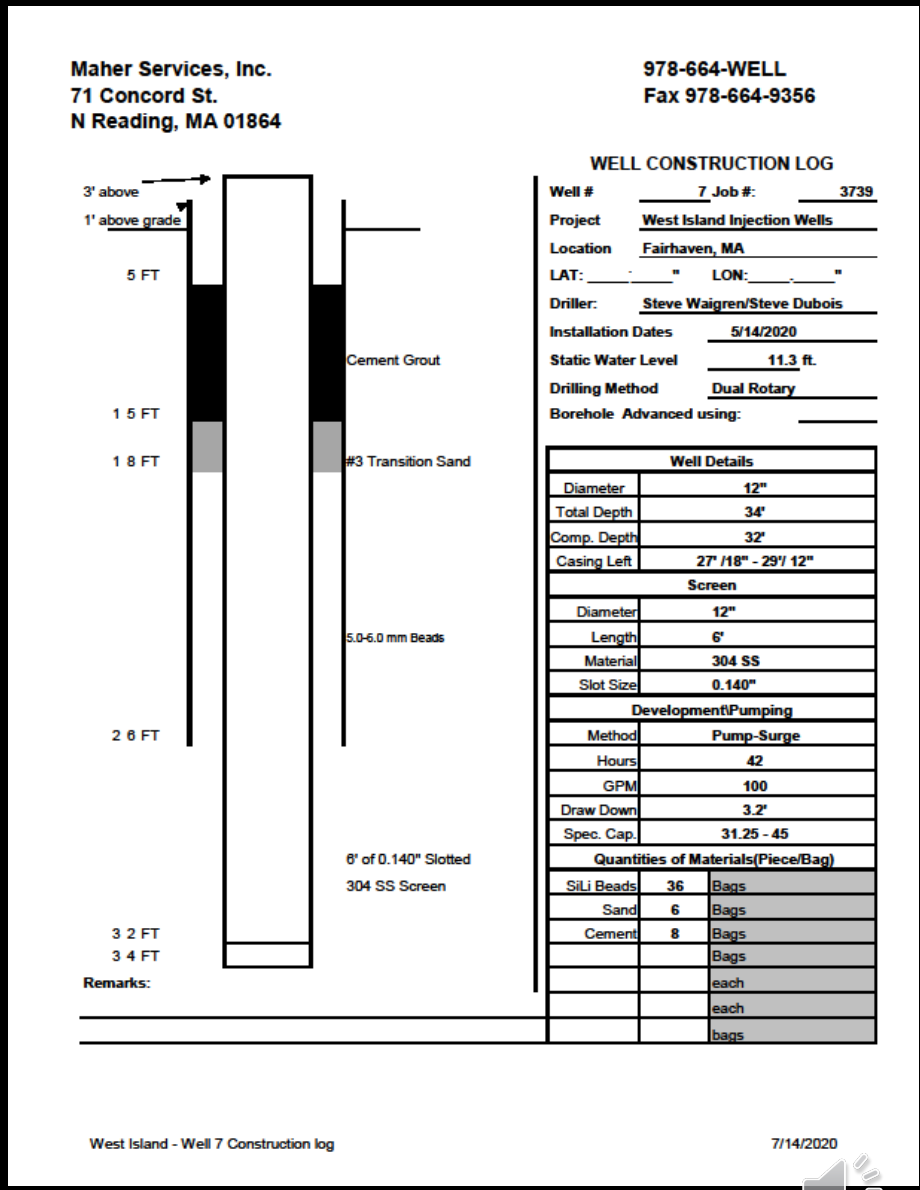
Remarks:

Well Details		
Diameter	12"	
Total Depth	34'	
Comp. Depth	32'	
Casing Left	27' /18" - 29'/ 12"	
Screen		
Diameter	12"	
Length	6'	
Material	304 SS	
Slot Size	0.140"	
Development\Pumping		
Method	Pump-Surge	
Hours	42	
GPM	100	
Draw Down	3.2'	
Spec. Cap.	31.25 - 45	
Quantities of Materials(Piece/Bag)		
SiLi Beads	36	Bags
Sand	6	Bags
Cement	8	Bags
		Bags
		each
		each
		bags

West Island - Well 7 Construction log 7/14/2020

Well #7 Development

- Well Developed by Pumping and Surging
- Pumping Rates up to 100 gpm over 42 Hours
- Specific Capacity 31.25 - 45 gpm/ft During Development
- Clean Discharge
- 8-Hour Injection Test – Overall Specific Capacity 25.32 gpm/ft



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WELL CONSTRUCTION LOG

3' above
1' above grade
5 FT
1 5 FT
1 8 FT
2 6 FT
3 2 FT
3 4 FT
Remarks:

Cement Grout
#3 Transition Sand
5.0-6.0 mm Beads
6' of 0.140" Slotted
304 SS Screen

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West Island - Well 7 Construction log 7/14/2020

Well #7 Completion/Startup

Town Completed Civil/Site/ Electrical/Instrumentation

Well Startup 6.15.20

- Partial Flow 1st Week
- Full Flow Week of July 4th
- Surface Water Level Increase OK

Town Now Has 4 Fully Functioning Wells – Wells #3, #4, #6 & #7 – Woo-Hoo!

ACKNOWLEDGEMENTS

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David Hill, Stantec

Richard Learned, Stantec

Bill Beyer, Stantec (Retired)

Reidar Bomengen, Maher Services, Inc.

Stantec

QUESTIONS?

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