



# Technical Memorandum

May 24, 2021

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To:	Town of Falmouth, MA <i>AK JJG</i>	Ref. No.:	11153041
From:	Anastasia Rudenko, P.E., BCEE, ENV SP J. Jefferson Gregg, P.E., BCEE	Tel:	774-470-1637 774-470-1640
CC:	File; Project Team		
Subject:	<b>South Coast Embayments – Preliminary Evaluations and Notice of Project Change Update Project</b> <b>FINAL Open Sand Beds 14 &amp; 15 Hydraulic Load Testing Summary</b>		

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## 1. Introduction

The Town of Falmouth (Town) is undertaking a Comprehensive Wastewater Management Planning (CWMP) Project to develop strategies for collecting, treating, and disposing of wastewater. A key element of that planning process is identifying sites in the Town where treated effluent (treated water) can be recharged to the groundwater.

A work plan was developed for an in situ treated effluent hydraulic load test—which was performed during the summer of 2020—to determine a potential hydraulic loading capacity range for Open Sand Beds 14 & 15 using flow treated at the Falmouth Wastewater Treatment Facility (WWTF) during the testing period. The methodology (see Attachment A - Work Plan Memo) was reviewed and approved by MassDEP in July 2020. The testing procedure was designed to evaluate the potential to increase the permitted rate to optimize the recharge capacity of the existing beds and minimize capital costs for additional effluent disposal capacity. In addition, an increase in permitted maximum day capacity would give the Town more flexibility in meeting its maximum daily and average annual flow limits.

The current groundwater discharge permit for the WWTF (Permit No.168-5 Modified) limits the average annual flow to Beds 14 & 15 to 260,000 gallons per day (gpd), and the maximum day flow to 470,000 gpd. Note that these limits are for the two beds together, not for each bed. The final bed area, as designed and constructed, was slightly larger than the planned bed area, so the permitted maximum flow (470,000 gpd) provides an actual hydraulic load of approximately 5.5 gpd/sf at maximum day conditions, though 7 gpd/sf was the design intent.

In addition, the Town will be undertaking a hydrogeological modeling evaluation to evaluate potential nutrient impacts if the recharge capacity of the site is increased.



## **2. Background**

The Town currently has 15 open sand beds for treated effluent recharge at the WWTF. Open Sand Beds 1 through 13 are located within the West Falmouth Harbor watershed. Open Sand Beds 14 & 15 are located outside of the West Falmouth Harbor watershed. The Falmouth WWTF is a Sequencing Batch Reactor (SBR), which is a batch process, so effluent discharge to the beds is not continuous. Discharge frequency depends on the total SBR cycle time which has normally been six hours for this WWTF. With two alternating SBRs each discharging every six hours, discharge began approximately every three hours during the hydraulic load test.

Hydraulic load testing was initially conducted with Town water in 2011 at the existing Open Sand Beds 14 & 15 site (designated as "Site 7" in planning documents) and is summarized in 'Technical Memorandum No. 8 – Hydraulic Load Tests at Sites 7 and 10', prepared by GHD and dated August 31, 2011. This testing was completed in anticipation of recharging treated effluent from the Little Pond Sewer Service Area (LPSA). During the constant head testing, the lowest observed infiltration rate at Site 7 was 103 gpd/sf. In the falling head testing, an average infiltration rate of 72 gpd/sf was measured. Based on EPA guidance that indicates loading rates should be based on 10 to 15% of measured basin infiltration rates, the design rate was set at 7 gpd/sf, which was 10% of the falling head test rate. Based on the results of the hydraulic load testing, MassDEP approval allowed this recharge rate over the typically allowed 5 gpd/sf loading rate for these types of soils<sup>1</sup>. The initial hydraulic load test report also stated that "discussions with MassDEP indicate that the design loading rate can be increased (and the facility capacity increased) once a facility is operated and there is a proven record of higher infiltration rates."

## **3. Hydraulic Load Testing Results**

Treated effluent hydraulic load testing occurred during August and September 2020 using treated effluent from the Falmouth WWTF. Daily observations were documented by the WWTF operators and groundwater levels were monitored using data loggers installed in monitoring wells.

### **3.1 Open Sand Bed 14**

Testing of Open Sand Bed 14 was conducted from August 5, 2020 through August 18, 2020. During this time-period all flow treated at the Falmouth WWTF was discharged to Open Sand Bed 14. Daily hydraulic loading rates for the testing period are summarized in Table 3.1 and Attachment B.

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<sup>1</sup> MassDEP guidance allows for 5 gpd/sf for sandy soils with typical percolation testing and soil evaluation. Hydraulic load testing is used to request rates higher than 5 gpd/sf, which was done in the case of Open Sand Beds 14 & 15.



**Table 3.1 – Open Sand Bed 14 Hydraulic Load Testing Summary**

Date	Effluent Flow Rate (gpd) – WWTF Effluent Only	Hydraulic Loading Rate (gpd/sf) – WWTF Effluent Only	Effluent Flow Rate (gpd) – WWTF Effluent + Precipitation	Hydraulic Loading Rate (gpd/sf) – WWTF Effluent + Precipitation
Minimum Observed	377,000	9.4	380,236	9.5
Maximum Observed <sup>1</sup>	520,000	13.2	523,734	13.2
Average Observed	460,090	11.7	462,223	11.7

Notes:

1. Maximum observed hydraulic loading rate was determined based on effluent flow available during the testing. Due to the limited amount of ponding observed during the test period (operators estimated a bed surface area coverage of 5 to 40% during the test, with most daily observations in the 10 to 15% range) it is apparent that Open Sand Bed 14 has a higher maximum hydraulic loading rate than that observed during the testing period.

The highest average daily hydraulic loading rate observed during this time-period was 13.2 gpd/sf on August 10, 2020, corresponding to the highest treated flow at the WWTF during this time-period. As documented in the following photos, shallow ponding of treated effluent over a portion (operators estimated 30 to 40%) of the open sand bed was observed during the testing on August 10<sup>th</sup>. Open Sand Bed 14 did not fill to the edges (never more than 30 to 40% surface area coverage) during the testing period. Since no standing water was observed to the edges of the bed, the hydraulic loading rate observed on August 10<sup>th</sup> (13.2 gpd/sf) represents a minimum estimated infiltration rate for the bed. The testing was limited by the amount of effluent available for recharge and it is evident that the actual maximum infiltration rate of this bed is higher than what was observed during this testing period.



**Bed 14 Facing West – Hydraulic Load Testing on August 10, 2020 at a daily average hydraulic loading rate of 13.2 gpd/sf.**



**Bed 14 Facing East – Hydraulic Load Testing on August 10, 2020 at a daily average hydraulic loading rate of 13.2 gpd/sf.**



### 3.2 Open Sand Bed 15 Testing

Testing at Open Sand Bed 15 occurred over the period between August 19, 2020 and September 17, 2020. Daily hydraulic loading rates for the testing period are summarized in Table 3.2 and 3.3.

Flow was initially switched from Open Sand Bed 14 to 15 on August 19. Standing water to the edges of the bed was first observed on August 21. On this date it was decided to rest the bed over the weekend following the 12:30 p.m. SBR effluent discharge to Bed 15, and to divert all flow to Open Sand Bed 14 during the rest period. At 3:00 p.m. on August 21 the observed ponding depth was 9- to 10-inches. During a site visit on August 22, 2020 at 10:45 a.m. the observed ponding depth was less than 1-inch over 15 to 20% of the bed, indicating that the bed had drained almost completely in less than a 24-hour period.

Following the resting period, testing of Open Sand Bed 15 resumed on Tuesday August 25<sup>th</sup> at 8:00 a.m. Hydraulic load testing was conducted on Open Sand Bed 15 from August 25 through August 28, and August 31 through September 2. Bed 15 was allowed to rest between each of these tests. During each rest period, bed 15 drained almost completely within 24 hours. During each testing period, 100% bed coverage was observed after approximately two days of testing, which allowed for the average daily infiltration rate into the bed to be calculated. Stakes were installed in the west and east end of the bed to allow the standing water depth to be measured at two points. Average daily infiltration rates during the standing water testing periods were calculated as an average of the two measurements and are summarized in Table 3.2. During the testing period the calculated infiltration range was 8.4 gpd/sf to 11.3 gpd/sf. The average infiltration rate during this time-period was 9.3 gpd/sf.

**Table 3.2 – Open Sand Bed 15 Hydraulic Load Testing During Standing Water Conditions**

Date	Total Flow – WWTF Effluent + Precipitation (gpd)	Measurement Period (hr)	Estimated Average Infiltration Rate (gpd/sf) <sup>1</sup>
8/26/2020	441,000	26.3	8.8
8/27/2020	433,240	23.7	9.4
9/1/2020	503,000	28.6	8.7
9/2/2020	417,201	20.9	8.4
9/3/2020	523,734	28.5	11.3
Average	463,635	-	9.3

Notes:

1. Average infiltration rate of the two measurement points.

The minimum, maximum, and average observed hydraulic loading rates for Open Sand Bed 15 are summarized in Table 3.3.



**Table 3.3 – Open Sand Bed 15 Hydraulic Load Testing Summary**

Date	Effluent Flow Rate (gpd) – WWTF Effluent Only	Hydraulic Loading Rate (gpd/sf) – WWTF Effluent Only	Effluent Flow Rate (gpd) – WWTF Effluent + Precipitation	Hydraulic Loading Rate (gpd/sf) – WWTF Effluent + Precipitation <sup>1</sup>
Minimum Observed	406,000	8.1	417,201	8.4
Maximum Observed	520,000	11.3	523,734	11.3
Average Observed	460,200	9.2	463,635	9.3

Notes:

1. Hydraulic loading rates are calculated by averaging two daily measurements.

On September 17, 2020 an additional day of standing water infiltration testing was conducted. Flow was diverted to Open Sand Bed 15 on Monday September 14 in order to develop a standing head condition for the testing. On September 17 water depth measurements were taken at 15-minute intervals from 11:00 a.m. through 4:00 p.m. The goal of the testing was to observe infiltration rates through at least one full SBR discharge cycle to establish an average infiltration rate for the testing period. An average infiltration rate of 8.7 gpd/sf was observed through this testing period.



**Standing Water Hydraulic Load Test Setup for Open Sand Bed 15**

### 3.3 Monitoring Wells

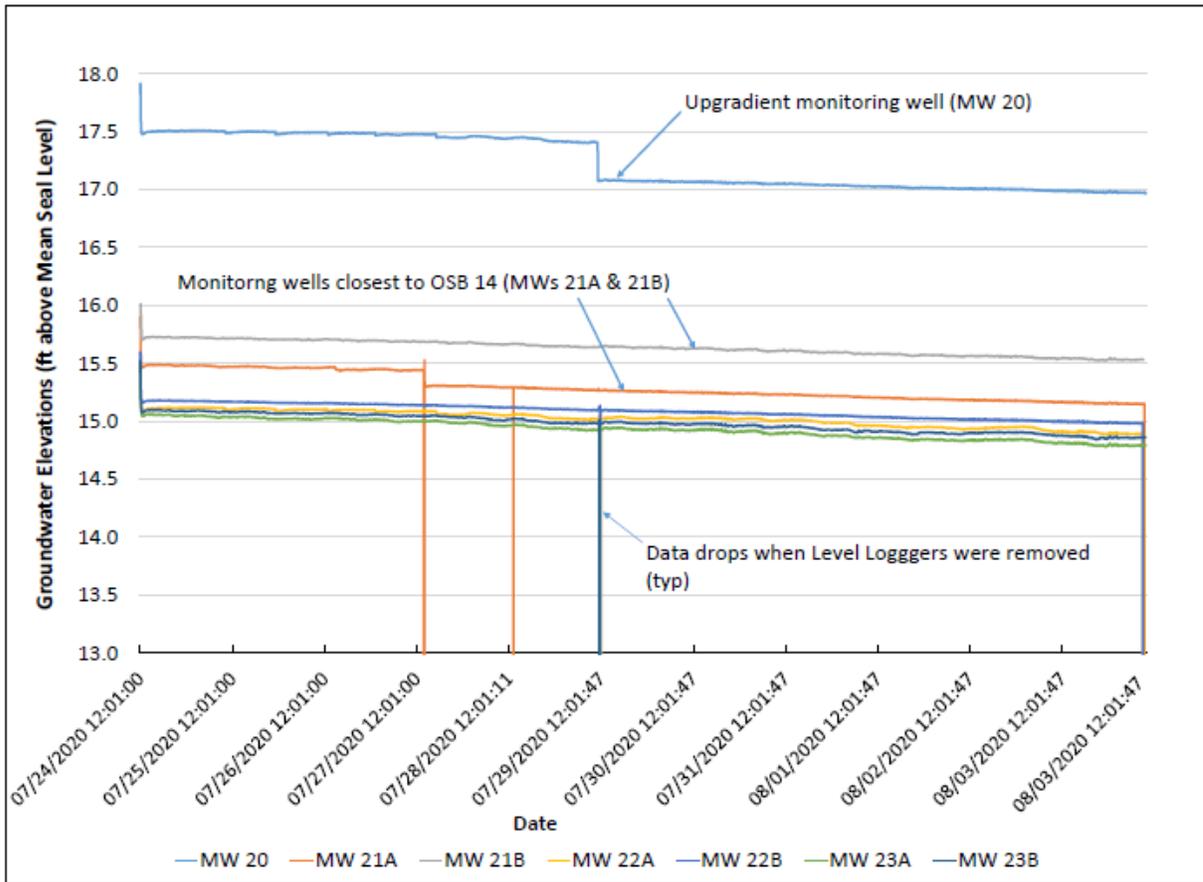
Level Loggers were installed in the monitoring wells outlined below to provide continuous water elevation measurements. The monitoring wells used for the hydraulic load test are outlined in Table 3.4. A figure outlining monitoring well locations is attached to the Work Plan (included as Attachment A).



**Table 3.4 – Monitoring Wells**

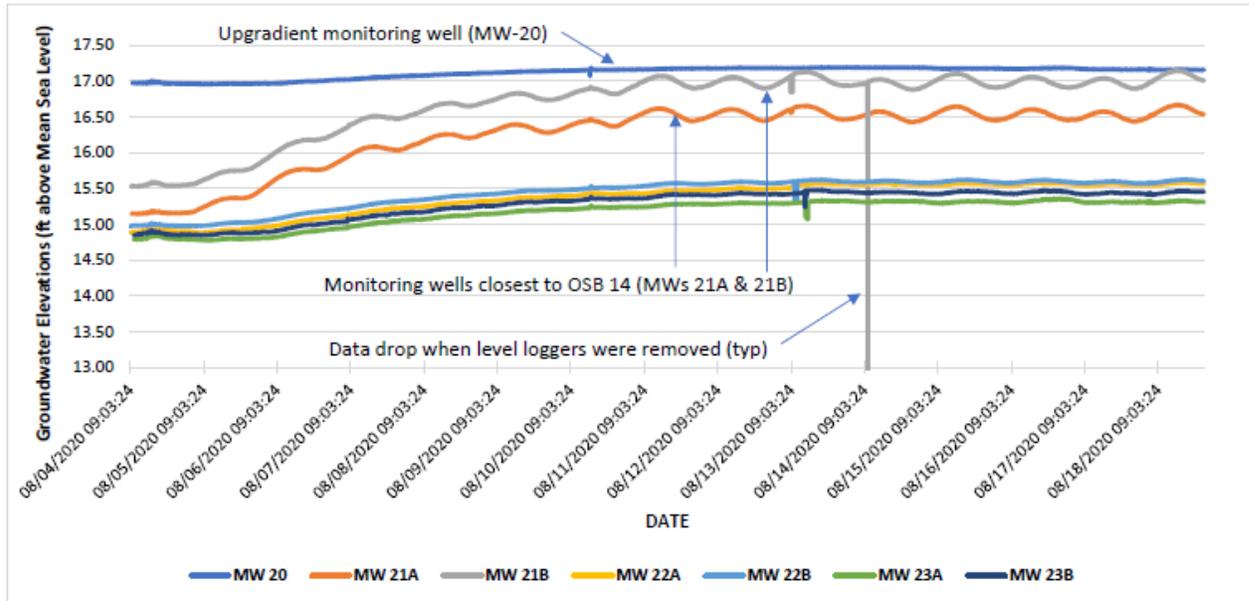
Monitoring Well	Approximate Ground El (ft)	Screen Bottom El (ft)	Distance to Sand Bed
MW 21A	72.19	8.15	12 feet from Open Sand Bed 14 Berm
MW 21B	72.17	-19.87	12 feet from Open Sand Bed 14 Berm
MW 22A	49.17	8.94	181 feet from open Sand Bed 14 Berm
MW 22B	49.05	-19.95	171 feet from Open Sand Bed 14 Berm
MW 23A	72.53	5.78	226 feet from Open Sand Bed 14 Berm
MW 23 B	72.48	-20.25	239 feet from Open Sand Bed 14 Berm
MW 20 (Upgradient)	89	6.69	130 feet from Open Sand Bed 15 Berm

The Level Loggers were installed on July 24 to gather background data prior to the testing period (see Figure 3.1). During this time-period, background water levels were in the range of 17- to 20-feet above mean sea level. The elevation of the open sand beds is approximately 67-feet above mean sea level. The change (drop) in the background data at MW 20 on July 29, 2020 was likely a result of a slight change in elevation of the Level Logger as it corresponds to the retrieval and replacement of the data logger. The change is only in 3-tenths of a foot (about 3 to 4 inches); however, the general trend of the groundwater condition did not change significantly. A similar effect can be seen at MW 21A on July 27. As these are background conditions that did not appear to change the groundwater trending (had they been adjusted), they were not considered significant to require manual adjustment. It should be noted that these similar events related to the resetting of equipment did not occur during testing.



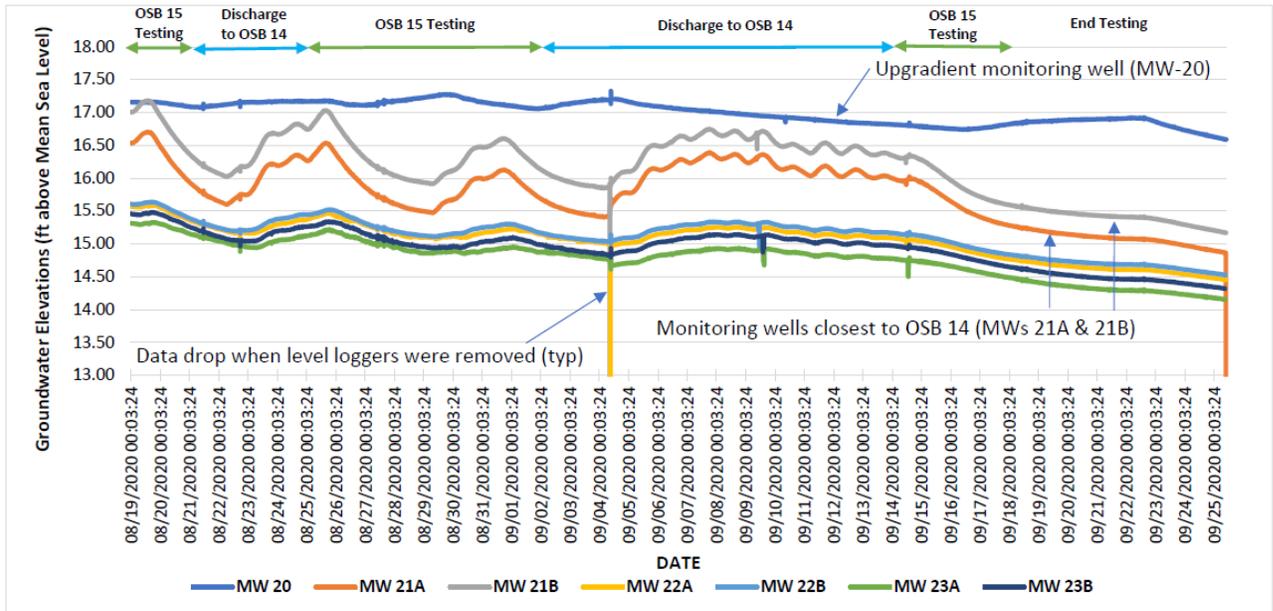
**Figure 3.1 – Background Monitoring Well Data – July 24, 2020 thru August 4, 2020 (Prior to Testing – No Discharge to OSBs)**

Figure 3.2 outlines monitoring well data collected through the testing period for Open Sand Bed 14. A general upward trend in water level was observed in all of the downgradient monitoring wells. The greatest increase in water level was observed at wells MW-21A and MW-21B, which are approximately 12-feet downgradient of Open Sand Bed 14. The ground elevation at wells MW-21A and MW-21B is approximately 72-feet. The distance between the ground elevation at these wells and the groundwater mound was at least 51-feet throughout the testing period. The cyclical SBR effluent discharge to the beds can be observed in the water level measurements for MW-21A and MW-21B.



**Figure 3.2 –Monitoring Well Data – August 4, 2020 thru August 18, 2020 (Open Sand Bed 14 Testing Period – Discharge to OSB 14 this Entire Period)**

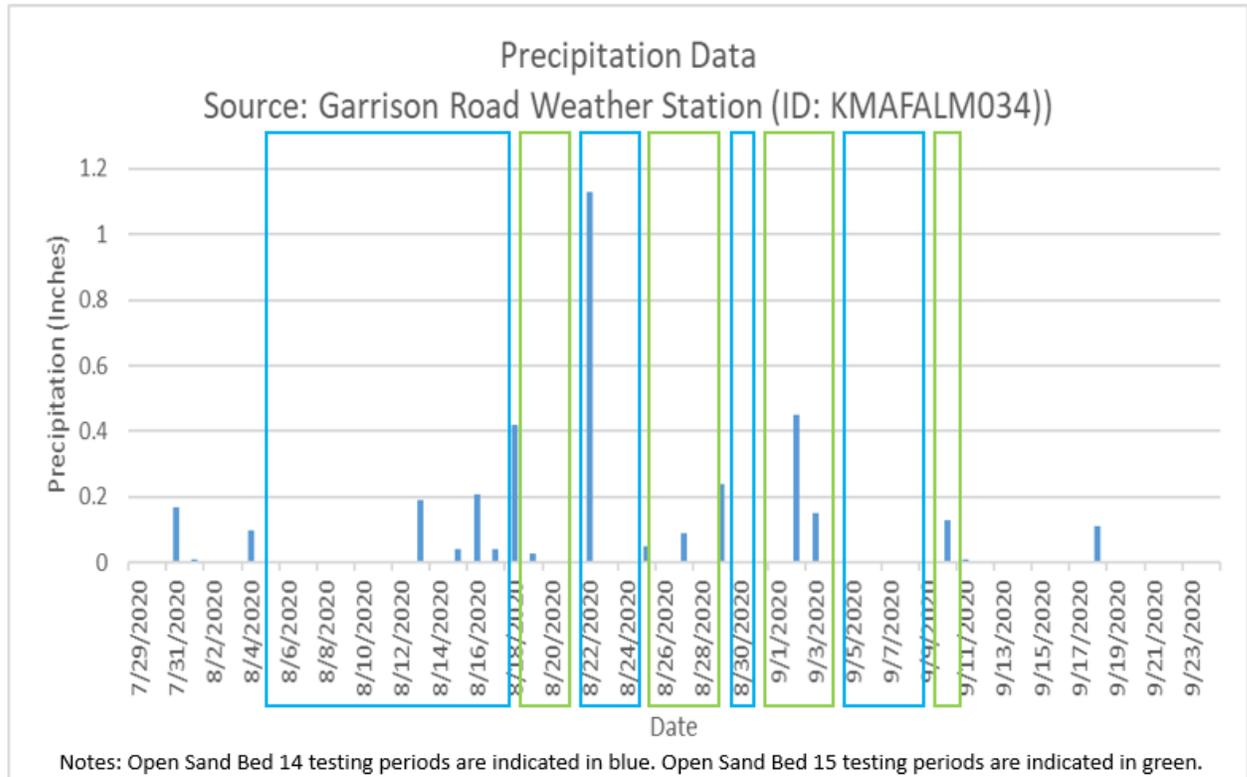
Figure 3.3 outlines monitoring well data collected through the testing period for Open Sand Bed 15 and the resting periods between each test when flow was diverted to Open Sand Bed 14. The greatest change in water level was observed in MW-21A and MW-21B (which are the closest monitoring wells to Open Sand Bed 14). The data shows the influence of the cyclical SBR effluent discharge cycle on groundwater elevation when flow is discharged to Open Sand Bed 14 and a downward trend in groundwater elevation at these two wells when flow is diverted to Open Sand Bed 15. This pattern is expected, due to the wells close proximity to Open Sand Bed 14. A minimal change in water elevation (less than 0.5 feet) was observed at the other monitoring wells throughout this testing period.



**Figure 3.3 –Monitoring Well Data – August 19, 2020 thru September 27, 2020 (Open Sand Bed 15 Testing Period – Discharge in this Period Alternated Between OSB 14 and 15 as Described in Section 3.2)**

### 3.4 Precipitation Data

Precipitation data from the week prior through the week after the test was obtained from the Garrison Road Weather Station (ID:KMAFALM034) and is summarized in the following Figure 3.4. Precipitation events are anticipated to increase the soil moisture, reducing empty pore spaces in the soil, and making the test findings more conservative. During the testing period hydraulic loading rates were calculated for treated effluent only and for an adjusted flow rate that incorporated the precipitation data. Only one rain event over 1-inch per day occurred during the testing period (during the testing of Open Sand Bed 14). Several rain events exceeding 0.25-inches occurred during the testing period, as outlined in Figure 3.4.



**Figure 3.4 – Precipitation Data**

### 3.5 Hydraulic Load Testing Summary

A minimum infiltration rate of 13 gpd/sf for Open Sand Bed 14 (active surface area = 39,007 sf) and an average infiltration rate of 9 gpd/sf for Open Sand Bed 15 (active surface area = 39,911 sf) were documented during this test. A maximum hydraulic loading rate for Bed 14 could not be established as the system was effluent flow limited. Based on this data, the weighted loading rate for the two beds is at least 11 gpd/sf (equivalent to 870,000 gpd on a maximum day basis), approximately twice the currently permitted maximum day flow to the existing beds.

The data presented in this memo will be evaluated in conjunction with nutrient particle track modeling to determine a proposed hydraulic loading rate for the site.

**Attachment A**  
**Technical Memorandum:**  
**Final Hydraulic Load Testing – Work Plan for**  
**Existing Open Sand Beds 14 & 15**  
**July 7, 2020**



# Technical Memorandum

July 7, 2020

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To: Town of Falmouth, MA Ref. No.: 11153041

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From: *AR*  
Anastasia Rudenko, P.E., BCEE, ENV SP Tel: 774-470-1637  
J. Jefferson Gregg, P.E., BCEE 774-470-1640

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CC: File; Project Team

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**Subject: South Coast Embayments – Preliminary Evaluations and Notice of Project Change Update Project**

**Final Hydraulic Load Testing – Work Plan for Existing Open Sand Beds 14 & 15**

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## 1. Introduction

The Town of Falmouth (Town) is undertaking a Comprehensive Wastewater Management Planning (CWMP) Project to develop strategies for collecting, treating, and disposing of wastewater. A key element of that planning process is identifying sites in the Town where treated effluent (treated water) can be recharged to the groundwater.

This memorandum outlines the methodology proposed for an in situ hydraulic load test to be performed during the Summer of 2020 to determine a potential hydraulic loading capacity range for Open Sand Beds 14 & 15, using flow treated at the Falmouth Wastewater Treatment Facility (WWTF) during the testing period. The current groundwater discharge permit for the WWTF (168-5 Modified) limits the average annual flow to Beds 14 & 15 to 260,000 gallons per day (gpd), and the maximum day flow to Beds 14 & 15 to 470,000 gpd. Note that these limits are for the two beds together, not for each bed. The final bed area as constructed was a bit greater than the planned bed area, so the permitted maximum flow (470,000 gpd) provides an actual hydraulic load of 5.45 gpd/sf, though 7 gpd/sf was the design intent.

The testing outlined in this work plan is intended to evaluate the potential to increase the permitted rate to optimize the recharge capacity of the existing beds and minimize capital costs for additional effluent disposal capacity. In addition, an increase in permitted maximum day capacity would give the Town more flexibility in meeting its daily and annual flow limits.

Concurrently, the Town is also undertaking a hydrogeological modeling evaluation to evaluate anticipated nutrient impacts if the recharge capacity of the site is increased.



## 2. Background

The Town currently has 15 open sand beds for treated effluent recharge at the WWTF. Open Sand Beds 1 through 13 are located within the West Falmouth Harbor watershed. Open Sand Beds 14 & 15 are located outside of the West Falmouth Harbor watershed.

Hydraulic load testing was initially conducted at the existing Open Sand Beds 14 & 15 site (designated as “Site 7” in planning documents) in 2011 and is summarized in ‘Technical Memorandum No. 8 – Hydraulic Load Tests at Sites 7 and 10’, prepared by GHD and dated August 31, 2011. This testing was completed in anticipation of recharging treated effluent from the Little Pond Sewer Service Area (LPSA). During the constant head testing, the lowest observed infiltration rate at “Site 7” was 103 gpd/sf. In the falling head testing, an average infiltration rate of 72 gpd/sf was measured. Based on EPA guidance indicating loading rates should be based on 10-15% of measured basin infiltration rates, the design rate was set at 7 gpd/sf, which was 10% of the falling head test rate. Based on the results of the hydraulic load testing, MassDEP approval allowed this recharge rate over the typically allowed 5 gpd/sf loading rate for these types of soils<sup>1</sup>. The initial hydraulic load test report also stated that “discussions with MassDEP indicate that the design loading rate can be increased (and the facility capacity increased) once a facility is operated and there is a proven record of higher infiltration rates.”

## 3. Work Plan

### 3.1 Monitoring Wells

The existing monitoring well network at Open Sand Beds 14 & 15 will be used to monitor localized groundwater elevations during the testing period. The initial hydraulic load testing at this site indicated that groundwater is approximately 70 feet below ground surface. Level Loggers will be installed in the monitoring wells used for the evaluation to provide continuous water elevation measurements. Groundwater levels will be measured at the following existing monitoring wells (see Attachment A for monitoring well locations):

- MW-20
- MW-21A & MW-21B
- MW-22A & MW-22B
- MW-23A & MW-23B

### 3.2 Testing Area

The hydraulic capacity of Open Sand Beds 14 & 15 will be evaluated through an in situ hydraulic load test using treated effluent from the Falmouth WWTF during the peak flow summer months. The WWTFs effluent flow meter will be used to track the flow being sent to the open sand beds.

During the testing period, all of the treated effluent from the Falmouth WWTF will be diverted to Open Sand Beds 14 & 15 using the existing gate structures.

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<sup>1</sup> MassDEP guidance allows for 5 gpd/sf for sandy soils with typical percolation testing and soil evaluation. Hydraulic load testing is used to request rates higher than 5 gpd/sf, which was done in the case of Open Sand Beds 14 & 15.



The following monitoring will be performed throughout the saturation and testing period:

- Daily flow to these two open sand beds and the corresponding hydraulic loading rates<sup>2</sup> will be documented. Hydraulic loading rates will be documented for (1) effluent only, and (2) the cumulative loading rate (effluent plus any precipitation on that date).
- The beds will be visually monitored daily by the WWTF staff for basin water coverage and for any signs of sloughing on the sand bed walls, or ponding outside of the beds.
- Groundwater monitoring wells—Manual groundwater readings will be taken weekly to confirm electronic reading accuracy, and Level Logger data will be downloaded weekly.

The proposed test will increase the loading rate first to Bed 15 for up to a month-long period and then flow will be diverted to Bed 14 for up to the same amount of time to establish the loading rates for each bed individually. Periodic updates will be provided to MassDEP throughout the testing period. The following methodology will be used for the testing:

1. Step 1 – Saturation: For a minimum of one week prior to the testing of each bed, flow will be sent to the bed at its design loading rate in order to saturate the soils and mimic operating conditions.
2. Step 2 – Individual Bed Testing:
  - a. Open Sand Bed 15: All of the WWTF flow will be directed to Open Sand Bed 15. The bed will be inspected daily by WWTF staff. The test will be run for up to one month if problems (ponding of more than 2 inches over entire surface of the bed) are not observed in the bed.
    - i. If ponding of more than 2 inches over the entire surface of the bed is observed for more than one day, flow will be diverted to Open Sand Beds 1 – 13 or through the passive overflow between Open Sand Beds 14 & 15, and the bed will be allowed to rest for one week.
    - ii. Once the bed has rested a decision will be made by GHD and the Town as to whether to continue or conclude the testing at this bed.
    - iii. Testing will only resume if the ponding is determined to be the result of a short-term peak in the flow being sent to the bed.
  - b. Open Sand Bed 14: Once the testing of Open Sand Bed 15 is completed all the flow will be diverted to Open Sand Bed 14 for up to one month following the same procedure as outlined for Open Sand Bed 15. The same procedure will be used to determine the average and maximum hydraulic loading capacity of Open Sand Bed 14 based on available WWTF effluent during that time period.

The hydraulic loading rate sent to each bed will be calculated daily, based on the flow sent to the bed and daily precipitation measurements. Following the up to one month of loading, the average and maximum loading rates observed for each bed (based on available flow) will be documented.

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<sup>2</sup> Calculated as the flow in gpd (effluent + precipitation) divided by the square footage of each bed as identified in the 'Town of Falmouth, Massachusetts Recharge Beds 14 & 15 Record Drawings', prepared by GHD and dated June 2017.



**3.3 Data Evaluation and Report Preparation**

The results of the hydraulic load testing will be evaluated to estimate the infiltration capacity of the site (in gallons per day per square foot).

Precipitation data, from the week prior to and through a week after the test, will be obtained from the Garrison Road Weather Station (ID: KMAFALM034). Meteorological data will be included along with a summary of the impact of any precipitation on the hydraulic loading rates observed during the testing period.

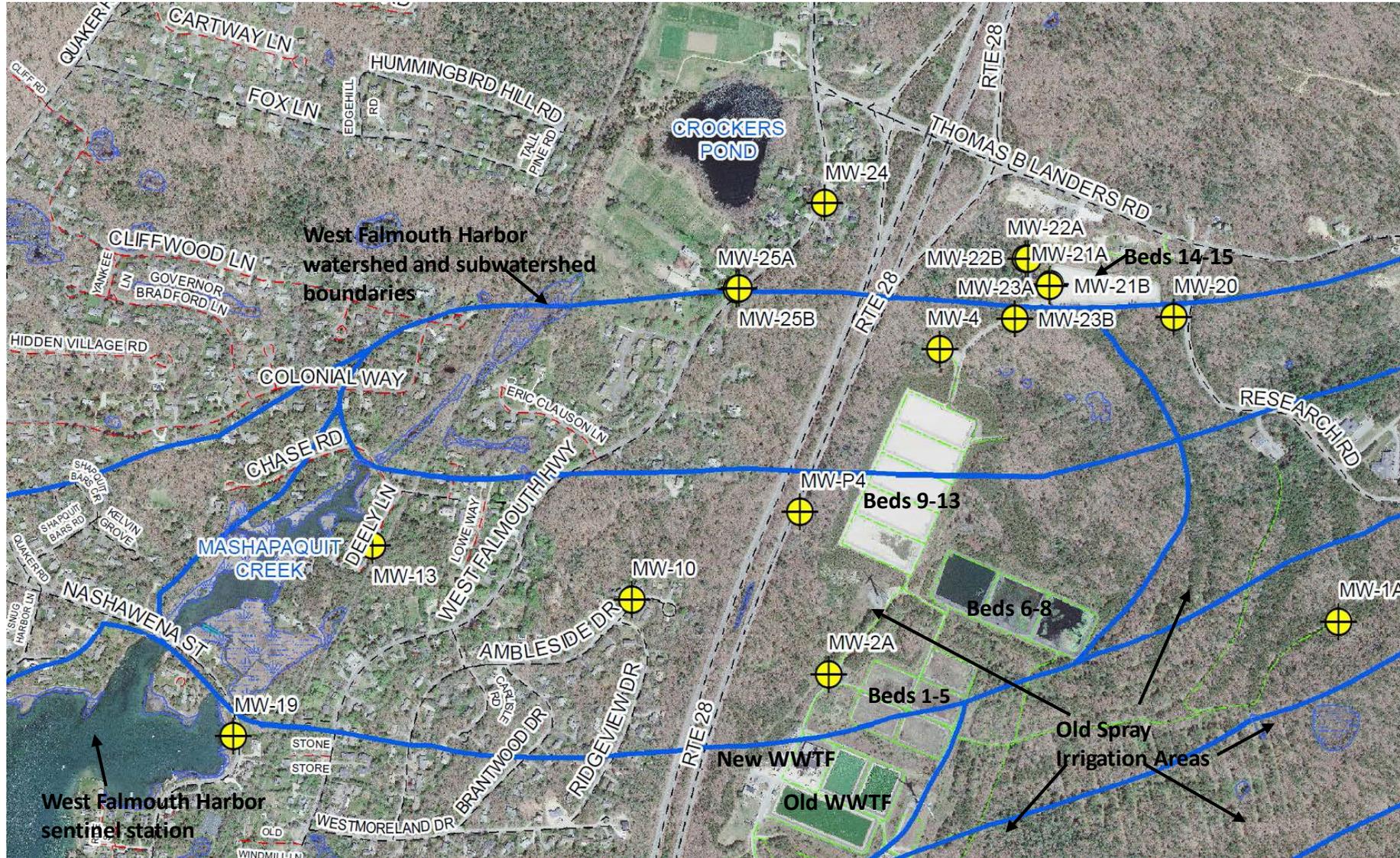
A letter report will be prepared describing the testing, presenting the results, and potentially identifying an increased infiltration capacity for the site.

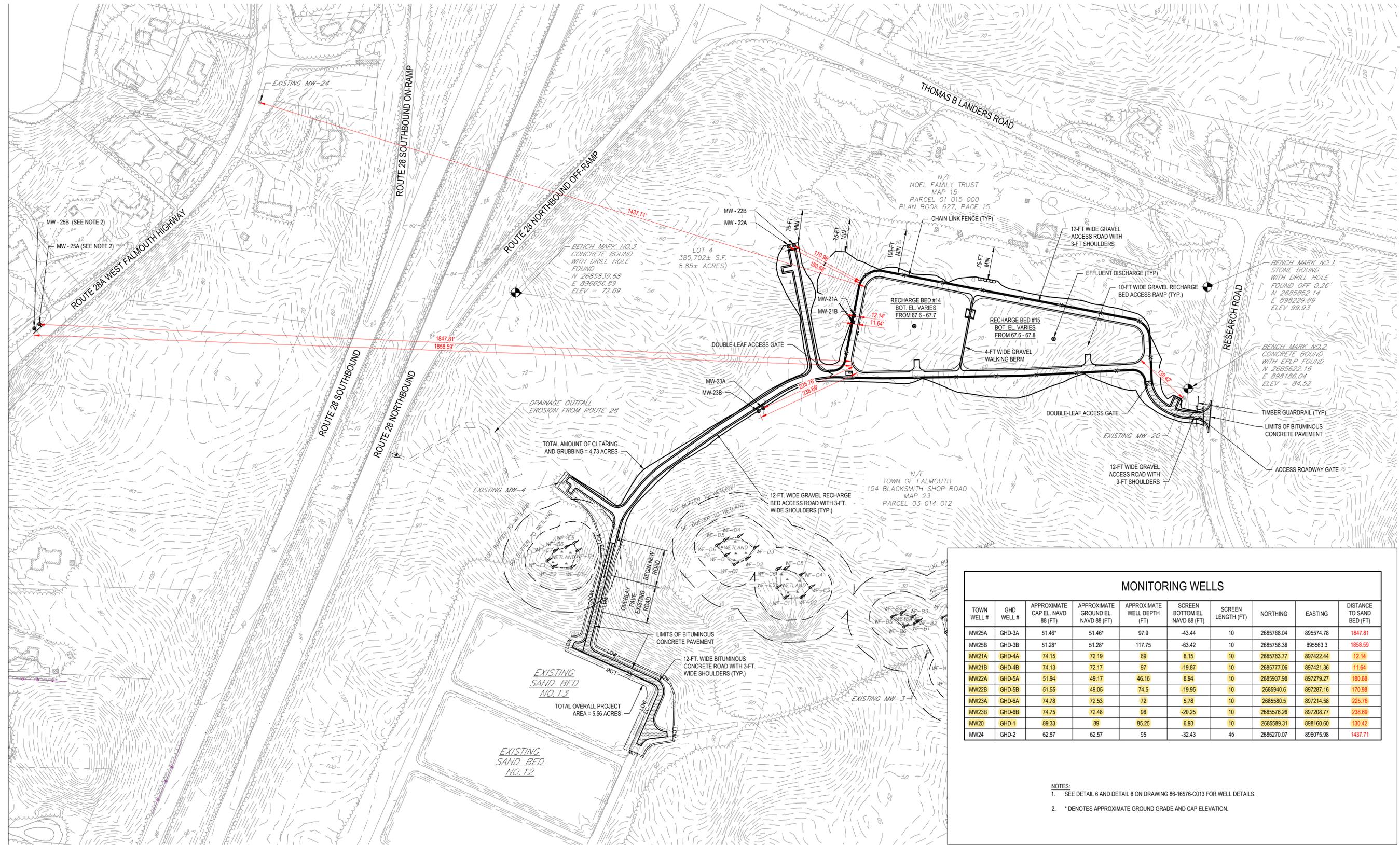
**3.4 Documentation of Modifications**

If field conditions warrant modifications to the above outlined procedures, those modifications will be documented in the letter report.

**Attachment A**  
**Open Sand Beds 14 & 15**  
**Groundwater Monitoring Network**

Attachment A: Falmouth Main WWTF - Locations of Recharge beds 1-15, Monitoring Wells, West Falmouth Harbor Sentinel Location and Watershed Boundaries

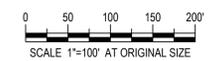




MONITORING WELLS									
TOWN WELL #	GHD WELL #	APPROXIMATE CAP EL. NAVD 88 (FT)	APPROXIMATE GROUND EL. NAVD 88 (FT)	APPROXIMATE WELL DEPTH (FT)	SCREEN BOTTOM EL. NAVD 88 (FT)	SCREEN LENGTH (FT)	NORTHING	EASTING	DISTANCE TO SAND BED (FT)
MW25A	GHD-3A	51.46*	51.46*	97.9	-43.44	10	2685768.04	895574.78	1847.81
MW25B	GHD-3B	51.28*	51.28*	117.75	-63.42	10	2685758.38	895563.3	1858.59
MW21A	GHD-4A	74.15	72.19	69	8.15	10	2685783.77	897422.44	12.14
MW21B	GHD-4B	74.13	72.17	97	-19.87	10	2685777.06	897421.36	11.64
MW22A	GHD-5A	51.94	49.17	46.16	8.94	10	2685937.98	897279.27	180.68
MW22B	GHD-5B	51.55	49.05	74.5	-19.95	10	2685940.6	897287.16	170.98
MW23A	GHD-6A	74.78	72.53	72	5.78	10	2685580.5	897214.58	225.76
MW23B	GHD-6B	74.75	72.48	98	-20.25	10	2685576.26	897208.77	238.69
MW20	GHD-1	89.33	89	85.25	6.93	10	2685589.31	898160.60	130.42
MW24	GHD-2	62.57	62.57	95	-32.43	45	2686270.07	896075.98	1437.71

NOTES:  
 1. SEE DETAIL 6 AND DETAIL 8 ON DRAWING 86-16576-C013 FOR WELL DETAILS.  
 2. \* DENOTES APPROXIMATE GROUND GRADE AND CAP ELEVATION.

OVERALL SITE PLAN - PROPOSED  
 SCALE 1" = 100'



NOTES: UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS AND RECORDS, AND THEREFORE THEIR LOCATIONS MUST BE CONSIDERED APPROXIMATE ONLY. THERE MAY BE OTHERS. THE EXISTENCE OF WHICH IS PRESENTLY NOT KNOWN. ANYONE USING UTILITY INFORMATION AND DATA PROVIDED HEREIN SHALL CALL DIG SAFE AT 811 SEVENTY TWO (72) HOURS, 3 BUSINESS DAYS IN ADVANCE TO VERIFY THE LOCATION OF UTILITIES PRIOR TO START OF CONSTRUCTION.

2	RECORD DRAWINGS	JDF	SLT			
1	CONFORMED PER ADDENDUM NO. 1	JDF	MRD	WRH	06/15	
0	FOR CONSTRUCTION	JDF	MRD	WRH	2/15	
No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date

**GHD**  
 GHD Inc.  
 1545 Iyannough Road, Hyannis Massachusetts 02601 USA  
 T 1 774 470 1630 F 1 774 470 1631  
 E hyamail@ghd.com W www.ghd.com

Drawn	JDF	Designer	JDF
Drafting	JDF	Design Check	MRD
Approved (Project Director)		Date	
Scale	AS SHOWN	This Drawing shall not be used for construction unless Signed and Sealed For Construction	

Client **TOWN OF FALMOUTH, MASSACHUSETTS**  
 Project **RECHARGE BEDS 14 & 15**  
 Title **OVERALL SITE PLAN - PROPOSED**  
 Contract No. **WW-14-04**  
 Original Size  
 Arch D Drawing No: **Distance to M**  
 Rev: **2**

**Attachment B**  
**Open Sand Beds 14 & 15**  
**Hydraulic Load Test Summary**

