December 12, 2024

Breeka Li Goodlander, Conservation Agent
Town of Franklin
Conservation Commission
355 East Central Street
Franklin, Massachusetts 02038

RE: **55 Constitution Boulevard**

              Notice of Intent MassDEP File Number: 159-1301

              MassDEP Review Comments

Dear Breeka Li:

Our office has received the Massachusetts Department of Environmental Protection (MassDEP) comments dated November 25, 2024. The review includes comments relative to the original Notice of Intent submittal dated October 28, 2024.

In order to simplify this letter, our office has the comments from MassDEP in italics and the Beals Associates, Inc responses in black.

<u>***Comment 1:***</u>

> *Post-development conditions within P.O.A. 1 are shown to result in an increase in runoff volume from previous conditions. The Applicant should investigate modifications that ensure that Standard 2 has been met.*

<u>**Response 1:**</u>

> Standard 2 states that "The Peak Rate Attenuation Standard requires that stormwater management systems be designed such that post development peak discharge rates do not exceed predevelopment discharge rates." and is silent on volumes. At P.O.A. #1, the peak discharge rates for the predevelopment condition are 27.94 cfs, 46.31 cfs and 78.52 cfs for the 2-, 10-, and 100-year storm event. The post development peak discharge rates are 27.18 cfs, 45.53 cfs and 78.24 cfs for the 2-, 10-, and 100-year storm events. This represents a decrease of 0.76 cfs, 0.78 cfs and 0.28 cfs for each of the three storms modeled.
> Since the post-development peak discharge rate does not exceed the pre-development peak discharge rate, Standard 2 has been met.

Comment 2:

The Applicant proposes two subsurface infiltration basins. Test pit data was not provided for the location of the larger subsurface infiltration system. Test pit data is required at the location of any infiltration BMP, one sample for every 5,000 sf of basin to verify seasonal high groundwater and soil type. The Applicant should provide recent test pit information and confirm the depth is at least 2 ft to SHGW and/or bedrock at all areas of proposed infiltration. If less than 4 ft to SHGW, a mounding analysis is required. A detail on the separation from SHGW should also be provided. See V2, Ch2, p88 of the MA Stormwater Handbook. Has a mounding analysis been conducted for Subsurface infiltration basin #1 as SHGW is shown to be within 4ft to the bottom of the structure?

Response 2:

The project only proposes a single infiltration system. It is believed that the reviewer may have thought the system closest to the building was also an infiltration system, but it is designed as a detention system only with no provision for infiltration. For the single infiltration system, two test pits have been performed for the 2,800 +/- sf system. The bottom of the system is at elevation 338.30 and the ESHGWT is at 336.30. A mounding analysis has been performed for Infiltration System #1 and is shown in Attachment B of this response letter.

Comment 3:

The site contains soils found within hydrologic soil group's C/D and D. Infiltration BMPs must be installed in soils capable of absorbing the recharge volume and must be able to drain within 72 hours. The required minimum infiltration rate for siting infiltration BMPs is 0.17 in/hr. D soils have a rate that is below that minimum. The applicant states that hydrologic soil group B was utilized for demonstrating compliance with Standard 3. The Applicant should provide adequate information demonstrating that the proposed BMPs are in compliance with Standards 2 & 3.

Response 3:

The NRCS mapping shows the site's soils to be mapped as HSG C and HSG D soils; however, onsite test pits performed by a Professional Engineer and Licensed Soil Evaluator discovered that the soils within the footprint of Infiltration System #1 were found to be sandy loam and loamy sands. Based on the observation and the test pits in the field, the Soil Evaluator determined these to be the infiltrative characteristics as indicated within the Stormwater Management Report.

Comment 4:

The Applicant should clarify the treatment trains. Are there two separate treatment trains directing stormwater to the infiltration BMPs? Each treatment train should have its own TSS Worksheet. Adequate pretreatment is required for an infiltrating BMP to achieve the listed credit percentage of TSS removal. TSS worksheets should be reviewed and revised accordingly as credit appears to have been taken for the pretreatment itself in addition to the 80% that can only be credited with pretreatment.

Response 4:

Treatment Train calculation sheets that clarify the treatment trains for the site can be found in Attachment A of this document. Since there is only one infiltration system, there is only a single treatment train to that BMP. The other treatment train is as follows:

Treatment Train - Deep Sump Catch Basins to Cascade Separator to Jellyfish Filter.

On behalf of the entire project team, we appreciate the opportunity to provide these responses and clarifications. We look forward to presenting this information to the Franklin Conservation Commission. If you have any additional questions or comments, please do not hesitate to contact us directly at either tmorey@bealsassociates.com, 617.242.1120 x103 or tlapshanski@bealsassociates.com, 617.242.1120 Ext. 110.

Sincerely,

Beals Associates, Inc.

Tyler Lapshanski   Todd Morey, P.E.

Project Engineer   Principal

Attach: TSS Removal Calculation Sheets & Mounding Analysis

CC: *Rebecca Gendreau, MassDEP*

       Jeff Sullivan, Northbridge

C-1381 File

ATTACHMENT A: TSS REMOVAL CALCULATION SHEETS (STORMWATER REPORT)

Location: Treatment Train 1

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump Catch Basin	25%	100%	25%	75%
CDS System (Propreitary Device)	80%	75%	60%	15%
Subsurface Infiltration System	80%	15%	12%	3%
Total TSS Removal =			97%	Completed for Each Outlet or BMP Train

Project: 55 Consitution Boulevard
Prepared By: Beals Assoc. Inc.

Date: 10-Oct-24

*Equals remaining load from previous BMP (E)

which enters the BMP

Location: Treatment Train 2

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump Catch Basin	25%	100%	25%	75%
Cascade System (Proprietary Device)	80%	75%	60%	15%
Jellyfish Filter (Proprietary Filtration Device)	85%	15%	13%	2%
Total TSS Removal =			98%	Completed for Each Outlet or BMP Train

Project: 55 Consitution Boulevard
Prepared By: Beals Assoc. Inc.

Date: 10-Oct-24

*Equals remaining load from previous BMP (E)

which enters the BMP

Attachment B: Mounding Analysis (Stormwater Report)

Infiltration System 1

Recharge Volume
=4,142 CF

Base Surface Area
=2,800 SF

Duration
=3.0 Days (24-hour storm, system must drain within 72-hour period)

Infiltration Rate 'R'
=(Recharge Volume/(Area x Duration)
=4,142 CF / (2800 SF x 3.0 Day)
=0.49 Ft/Day

Required Recharge
HSG B = 0.35 Inches of Runoff

Specific Yield Values 'Sy'	
Coarse Gravel	0.23
Medium Gravel	0.24
Fine Gravel	0.25
Coarse Sand	0.27
Medium Sand	0.28
Fine Sand	0.23
Silt	0.08
Clay	0.03

Hydraulic Conductivity Values (ft/day) 'K'		
Material	Average	Range
Fine Gravel	1476	1181-3280
Medium Gravel	886	689-1181
Coarse Gravel	492	328-689
Coarse Sand	148	65-328
Medium Sand	39	16-65
Fine Sand	9	3-16
Silt	0.3	0.03-3
Clay	0.0007	<0.03
S & G Mix	172	16-328
S & G Glacial Till	- -	<100
Glacial Till	- -	<10

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin.   More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

			use consistent units (e.g. feet & days **or** inches & hours)	Conversion Table	
Input Values				inch/hour	feet/day
0.4900	*R*	Recharge (infiltration) rate (feet/day)		0.67	1.33
0.230	Sy	Specific yield, Sy (dimensionless, between 0 and 1)			
9.00	K	Horizontal hydraulic conductivity, Kh (feet/day)*		2.00	4.00
38.000	x	1/2 length of basin (x direction, in feet)			
22.000	y	1/2 width of basin (y direction, in feet)	hours	days	
3.000	t	duration of infiltration period (days)	36	1.50	
100.000	hi(0)	initial thickness of saturated zone (feet)			

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

|		
100.595	h(max)	maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
0.595	Δh(max)	maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
0.595	0
0.559	20
0.439	40
0.370	50
0.316	60
0.272	70
0.235	80
0.204	90
0.178	100
0.136	120

Re-Calculate Now

Groundwater Mounding, in feet
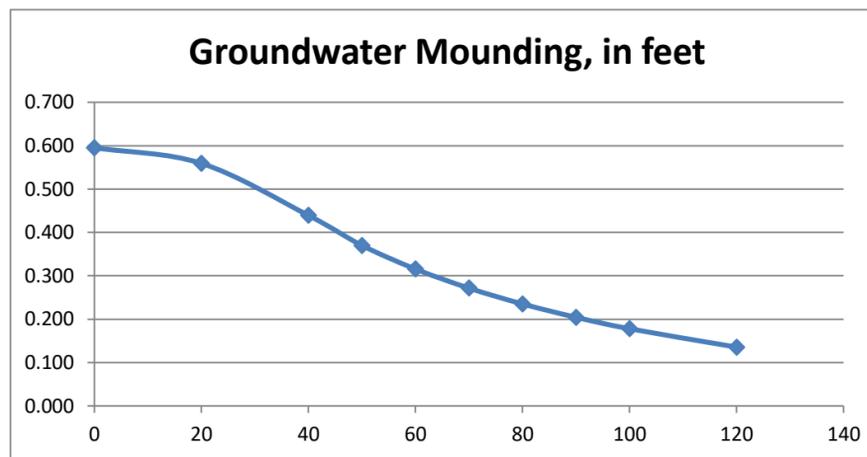
Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.