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May 10, 2024

Ms. Breeka Lí Goodlander, Agent
Town of Franklin Conservation
Commission 355 East Central Street
Franklin, MA 02038

Regarding: Grove Street Residences – 121
MassDEP File No. 159-1286
Notice of Intent Peer Review

Dear Ms. Goodlander:

RJ O'Connell & Associates (RJOC) and Lucas Environmental (LE) have reviewed the comments issued by BETA Group, Inc. (BETA) within their second peer review letter dated May 1, 2024, and have prepared responses in this letter and included attachments, as necessary.

Enclosed are the following documents that have been included with this letter to address these comments:

1. Revised Notice of Intent Plan Set dated 10/30/23, revised through 05/10/24
2. Stormwater Management Report dated 12/18/23, revised through 05/10/24
3. The following attachments:
    - Attachment 1: Groundwater Mounding Analysis (PSIS-1/SWB-1)
    - Attachment 2: Frimpter Method ESHGW Adjustment for TP-07

The comments from BETA's second review are listed below in **blue** with the corresponding numbering from their letter, and our responses follow in ***red italics***. (Please note that any comments that BETA referred to as "addressed" or that require "no further comment" have been removed from this response letter).

PLAN AND GENERAL COMMENTS

A1. The Massachusetts Department of Environmental Protection (MassDEP) has issued a DEP file number (159-1286) with the following technical comments:

b. "It is recommended that phased erosion controls are provided in addition to the construction sequence. Temporary swales and basins shall be shown on (phased) erosion control plans".

RJOC: Phased erosion control plans have been completed and included in the revised plan set. These include temporary swales and basins. (See Sheets C-1A through C-1D).

BETA2: See BETA2 response to Comment W6.

***RJOC-2:* Construction Sequencing for the Proposed Boardwalk Crossings have been added to Sheet C-1C.**

c. "The site of the future infiltration basins should not be used as temporary sediment traps for construction activities, see V2, Ch2, p91 of the SW Handbook".

RJOC: The plans have been revised to provide notes on the Erosion Control Plans that the bottom of the temporary sediment basin at the location of the infiltration basin (stormwater basin-1) shall be set one foot above the bottom of the proposed infiltration basin to ensure the underlying soil is not adversely impacted. Excavation of the bottom one foot to final grade and the installation of the crushed stone shall not be completed until after final stabilization. This last foot of excavation after site stabilization will remove all sediment and protect the underlying soil.

BETA2: According to the Massachusetts Stormwater Handbook, cited by MassDEP, an infiltration basin should never be used as a temporary sediment trap for construction activity. If excavation occurs, light earth-moving equipment for excavation of the infiltration basin should be used rather than heavy equipment due to the likelihood of compaction while using heavy equipment. The Commission could consider incorporating these requirements as a Special Condition.

***RJOC-2:* The applicant has no issue with a Special Condition for use of light earth-moving equipment within the infiltration basin area to excavate the bottom one foot after final stabilization. Note #25 on Sheet C-1B has been revised to reflect the condition that only light-earth moving equipment shall be used for excavation within the basin area.**

CONSTRUCTION COMMENTS

W3. Provide information supporting the location of the sewer line below the streambed at both stream crossings instead of within or along the roadway above the stream. Should the proposed location be required due to design/Site constraints, provide details on how construction will occur as it relates to the nature of the Resource Area impacts (i.e., open trench excavation versus directional drilling, and construction sequencing).

RJOC-1: To allow for gravity sewer connection to the town sewer system and crossing of other utilities and drainage the proposed sewer line needs to be below the streambed at both stream crossings. The sewer lines are proposed below the streambeds, and above the footings of the culverts. The installation of the sewer lines will occur using trench excavation at the same time as the construction of the culverts, while the streams are temporarily diverted, and the surrounding resource area protected. See response to W5 for details on construction which will occur at the same time as the culverts. The existing streambed soils will be removed and stockpiled separately for reuse in reestablishing the streambed. The sewer lines are to be bedded as noted on the detail on Sheet C-10 and then backfilled with the existing channel bed material up to the final channel elevation within the culverts.

BETA2: Comment partially addressed. BETA recommends that details relating to the installation of sewer lines as described above be included in the stream crossing construction sequence provided on Sheet C-1C.

***RJOC-2:* The Construction Sequencing on Sheet C-1C has been revised to include the**

installation of the sewer lines as Section 4.1 within the Intermittent Stream Crossings Construction Sequencing section.

W5. Erosion controls should be depicted on all sheets to demonstrate Project constructability. BETA offers the following comments on the proposed erosion controls:

a. Erosion controls consisting of siltation fencing and compost filter tubes are proposed to be installed across the stream at both intermittent stream crossings as shown on the Demolition and Erosion Control Plan (Sheets C-1A and C-1B). These erosion controls are not a typical method of in-water erosion, sedimentation, and/or turbidity control. Clarify what time of year the crossing work will occur, what erosion controls will be used for in- water work (i.e., cofferdams), and how water will be controlled during construction of the crossing. To comply with the Section 404 Massachusetts General Permit, in-water controls should only be in place while required to complete the crossing work. At a minimum, the Applicant should provide location-specific water control and dewatering details for the proposed culvert work.

RJOC-1: Phasing plans (C-1A through C-1D) have been developed to depict erosion control measures to be implemented during construction of the proposed project. The in-water erosion, sedimentation and/or turbidity controls have been revised at the proposed stream crossings to include sandbag cofferdams, pumps and water filter bags. These will be used to control the water flows within the intermittent streams during the construction of the culverts and to pump the water to the downstream side of the culverts to a filter bag. Details reflecting these controls have been provided on Sheet C-6. The crossing work will occur during forecasted dry periods and periods of low flow, where feasible. A note has been added to the plans that in-water controls will be removed as soon as possible once the work is completed and that area is stabilized.

BETA2: Comment partially addressed. Additional comments on the proposed water controls are as follows:

- **Use of silt fence to supplement the sandbag cofferdam as shown in the detail (Sheet C-6) is unlikely to contribute to the efficacy of the cofferdam. BETA recommends that silt fence be removed and replaced with an impermeable material that will cover and protect the sandbags such as wrapped plastic sheeting.**
- **The downstream side of both Intermittent Stream Crossings No.1 and No.2 shows use of silt fence/ compost sock through the stream channel as a water control. Silt fence is unlikely to be an effective control; however, compost filter tubes (or sandbags, depending on water depth) could be used as an added protection to the downstream Resource Areas and mark the limit of work. It is recommended that the Applicant select a different water control method for the intermittent stream crossings. Downstream water/ erosion controls at both stream crossing should be specified on the plans.**
- **BETA recommends that the water filter bags for dewatering at both intermittent stream crossing be located further upgradient of the Resource Areas. A discharge of dewatering water to a Resource Area is subject to additional reporting requirements under the EPA NPDES**

for which this Project will be subject to.

- **The Post Demolition Construction Sequence on Sheet C-1C does not identify a phase of the Project that the intermittent stream crossings will be installed. Revise the construction sequence accordingly or include this information on the Construction Phasing Plan (Sheet C-1E).**

The Commission could consider a Special Condition in the OOC that the Agent be notified prior to the construction of the intermittent stream crossings, and that a plan showing in-water controls and dewatering for each stream crossing be submitted to the Agent for review and approval prior to construction.

RJOC-2: ***Responses to the comments on the proposed water controls are as follows:***

- ***The sandbag cofferdam detail on Sheet C-6 has been revised to remove the silt fence and provide an impermeable material to cover the sandbags.***
- ***The silt fence/compost sock proposed downstream of the crossings has been removed and replaced with sandbag cofferdams.***
- ***The water filter bags have been relocated further upgradient of the Resource Areas and an additional line of erosion control has been provided adjacent to each filter bag.***
- ***The Post Construction Sequence on Sheet C-1C has been revised to include the installation of the culverts at the intermittent stream crossings within Note #4. Additionally, Notes #4 & 5 within the Rough Grade Phase on Sheet C-1E have been revised to note the installation of stream diversion activities and stream crossing construction.***

b. No erosion controls are shown at the location of either of the proposed boardwalks. Depict erosion controls proposed for boardwalk construction, describe the anticipated method of construction, and quantify any additional temporary BVW impact associated with installation of erosion controls, anti-compaction measures (i.e., swamp mats), and access for construction.

RJOC-1: Erosion controls have been added adjacent to the proposed boardwalks within the existing wetlands and ground protection (construction) mats have been proposed at the intermittent stream crossings. The impact areas associated with the additional erosion controls have been revised and are reflected in the revised Wetland & Buffer Zone Impact Exhibit in Attachment 3 of this letter.

The applicant is anticipating constructing the boardwalks using a handheld helical pile installer for the screw pile bases. This will involve the use of chainsaws to clear the area and then using a walk behind skid steer to transport the building material through the proposed boardwalk corridor. However, if screw piles cannot be installed in some areas, due to shallow ledge, the contractor may need to install 12-inch concrete footings. Although helical piles are the preferred method of installation to minimize impact, the

calculations of impact areas were conservatively calculated assuming the need for the 12- inch concrete footings.

The limits of work have been revised, as necessary, and the temporary/permanent BVW impact calculations have been updated as depicted on the Wetland & Buffer Zone Impact Exhibit in Attachment #3 of this response letter.

BETA2: Comment partially addressed. BETA recommends use of swamp mats throughout the length of the boardwalk installation where work is proposed within BVW. The Applicant should also provide a construction sequence for the proposed boardwalks, similar to the sequence provided for the intermittent stream crossings on Sheet C-1C of the Project plans. The Commission could consider a Special Condition in the OOC that a boardwalk-specific construction sequence, including stabilization and restoration of temporarily impact BVW, be provided to the Agent for review and approval prior to construction.

RJOC-2: Labels have been added in the plan view of Sheets C-1C & C-1D indicating that Ground Protection Mats shall be used within limits of wetland; A detail of a Typical Ground Protection Mat has been provided on Sheet C-5; Boardwalk Construction Sequencing has been added to Sheet C-1C.

W6. The Project will require significant clearing and grubbing. Provide a phasing plan to supplement the erosion control plan that limits the total area of disturbance at the Site at a time. This plan should also include timing on environmentally sensitive activities including stream/BVW crossings (roadways and boardwalks), the wetland replication area, and the stream restoration area. In addition, all staging/stockpile areas should be staked in the field prior to advancing phases. The Commission could consider a Special Condition in the OOC requiring the Applicant achieve stabilization to the satisfaction of the Commission or their Agent prior to advancing phases.

RJOC-1: Erosion and Sediment Control Plans (C-1C & C-1D) have been prepared to illustrate the construction phasing of the proposed site work. Additionally, a Construction Phasing Plan (C-1E) has been prepared, and is included within the revised Plan Set, depicting the anticipated construction zones and sequences for the project.

BETA2: Comment partially addressed. The Construction Phasing Plan (Sheet C-1E) does not indicate when the boardwalks will be constructed. Review of the Erosion and Sediment Control Plans, however, indicates that construction of the boardwalks, intermittent stream crossings, and wetland replication area will occur within Phase II of the Project.

The Commission could consider the following Special Conditions in the OOC:

- **The wetland replication area and the stream daylighting efforts will be established and temporarily stabilized prior to constructing the adjacent roadway crossing over the intermittent stream (Intermittent Stream Crossing No.1) and prior to any other Resource Area alterations at the Site.**
- **Prior to the start of construction, a revised construction phasing plan that outlines the timing on environmentally sensitive activities including stream/BVW crossings (roadways and boardwalks), the wetland replication area, and the stream restoration will be provided to the Commission or its Agent for review and approval.**

RJOC-2: The Construction Phasing Plan (Sheet C-1E) has been revised to include the

installation of the boardwalks at #6 within the Rough Grade Phase.

Regarding the suggested Special Conditions in the OOC:

- **Note #4 has been added to Sheet C-2C, under the General Wetland & Stream Daylighting Replication Notes, stating that the wetland replication and stream daylighting efforts shall be completed prior to the issuance of the first Certificate of Occupancy. It additionally notes that an as-built plan and a letter from the wetland scientist, certifying the completion of the work, shall be submitted to the Commission.**
- **The Construction Phasing Plan has been revised to include the sequencing of the environmentally sensitive activities referenced in the comment.**

W7. In addition to a phasing plan for the entire Project, a construction sequence and plan specific to the proposed intermittent stream crossings should also be provided. This plan should include the following:

a. Installation of erosion and sedimentation controls, and in water controls as appropriate;

RJOC-1: Phased erosion control plans for construction have been prepared on Sheets C-1A through C-1D and are included in the revised plan set. These plans provide sequencing for erosion control and construction.

BETA2: See BETA2 response to comment W5.a.

RJOC-2: See RJOC-2 response to comment W5.a.

c. Restoration of temporarily impacted LUW and Bank.

RJOC: Impacted areas of Bank will be restored to pre-existing conditions, i.e., the existing substrate will be restored to a natural state that are present prior to construction. The land between the Banks will also be restored to pre-existing conditions, which BETA is generally referring to as LUW.

BETA2: See BETA2 response to Comment W11 and W12.

RJOC-2: See RJOC-2 response to Comment W11.

MITIGATION COMMENTS

W11. BETA offers the following comments with regards to the wetland replication area and associated stream daylighting efforts:

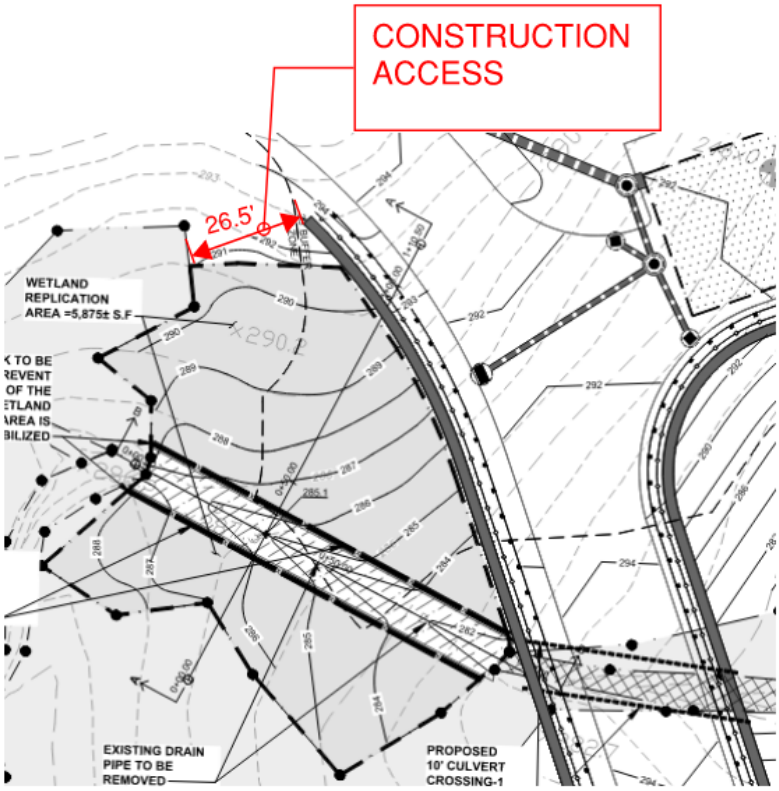
c. BETA recommends that the wetland replication area and associated stream daylighting efforts be established and temporarily stabilized, at a minimum, prior to constructing the adjacent roadway crossing over the intermittent stream. Construction of the roadway and adjacent temporary drainage swale will severely limit access to the wetland replication area. This could be included as a Special Condition in the OOC.

RJOC-1: Construction phasing proposed for the project calls for the area of the wetland replication area to be used as a temporary sediment basin. Upon stabilization of the site, the temporary sediment basin will be removed and at that time the wetland replication and associated stream daylighting efforts will occur. Performing the work for the wetland replication and associated stream daylighting efforts at this time would also limit the risks of any damage to these areas during overall site construction.

BETA2: Comment remains. To prevent unnecessary compaction of the soil in the location of the wetland replication area and to establish mitigation areas early on in the Project's schedule, BETA advises against use of this area as a temporary settling basin during project construction. As previously noted, access will be limited following the construction of the roadway and the adjacent drainage swale.

RJOC-2: As discussed during the Public Hearing on May 2, 2024, this area is required for access to the upland areas across the stream and necessary for use for construction of the new stream/wetland crossing. It is not feasible to construct the replication area prior to construction of the new crossing as there is no other viable access to the northern side of the stream. Additionally, relocation of the temporary sediment basin would likely require additional impacts to the 100-Foot Buffer Zone and the 25-Foot Buffer Zone. Upon completion of the use of the temporary sediment basin, the soils will be removed and appropriate wetland soils will be placed to construct the wetland mitigation area. Compaction is not a concern in this area and can be addressed during the wetland replication area construction if necessary.

Once the roadway has been constructed the drainage swale and temporary sediment basin will be removed, as the drainage infrastructure will be installed within the roadway (with siltsaks installed in the catch basins). This will allow for a 26.5' wide access path between the retaining wall and the limit of work line to allow for the construction of the replication areas, as depicted below:



d. As part of the proposed wetland replication area, the Applicant proposes to daylight 180 linear feet (920 sf) of culverted stream; however, minimal details on sequencing and approach are provided. Provide information including the

proposed profile of the streambed and the proposed bankfull width (and how these were determined), the proposed gradient of the stream, how the restored stream will tie into the existing BF2 Series streambed and Bank elevations, how the streambed and Banks will be stabilized (temporarily and permanently), and what type of substrate is proposed/how it was determined based on existing fluvial processes. Additional erosion controls will also be required to prevent sedimentation of the stream while the wetland replication area is being stabilized.

RJOC-1: Construction sequencing for the existing drainpipe removal and intermittent stream construction has been provided on Sheet C-1C. Additionally, Sheet C-2C has been revised to include a profile of the stream bed, depicting the slope and tie in elevations to the adjacent wetlands and proposed culvert. The plan view on Sheet C-2C has been revised to depict compost sock erosion and sedimentation barriers be installed on either side of the proposed intermittent stream until the wetland replication area is stabilized. Bankfull Determination Exhibits have been prepared and are included in Attachment #4 of this response letter depicting how the bankfull widths were determined for the stream crossings. Notes have been added to the intermittent stream details on Sheet C-9 stating that the existing streambed soils will be removed and stockpiled separately for reuse in reestablishing the streambed.

BETA2: Comment partially addressed. Attachment 4 shows the locations where bankfull width measurements were taken in the field at the locations of Intermittent Stream Crossings No.1 and No.2, and the submitted profile depicts how the daylighted stream channel will tie into adjacent existing grades. However, information regarding how the streambed and Banks will be stabilized (temporarily and permanently) and the type/rationale for selection of the streambed substrate within the daylighted channel is still required. It is not anticipated that appropriate streambed material will be generated through the removal of the drain pipe to restore the daylighted portion of the stream channel. In addition, it is recommended that staked coir logs of an appropriate diameter be used to establish new Banks.

The Commission could consider including a Special Condition requiring a plan be submitted to the Commission or its Agent for approval prior to the construction of the wetland replication area and stream daylighting efforts which documents:

- **A method for stabilization of the Banks associated with the stream daylighting efforts (i.e., coir logs and erosion control netting);**
- **Specific native seed mix proposed for use along the Bank; and**
- **Substrate proposed for the streambed.**

***RJOC-2:* Sheet C-2C has been revised to include the following:**

- ***Coir Logs and Erosion Control Netting to be used on the banks; labels have been added to Section View A-A.***
- ***A label stating that native seed mix shall be used on the banks has been added to Section View A-A.***
- ***Additional note has been added under Section 8.4 Stream Restoration, stating that "upon removal of the existing pipe, any non-native fill will be removed and the existing substrate will be utilized as the streambed.***

W14. BETA offers the following comments on the Landscape Plans:

b. Areas of proposed lawn that do not appear to be necessary for public use/access (i.e., south of Building #2 along the parking area) should be vegetated with native, herbaceous species and mowed only once per year during late fall. BETA recommends a Special Condition requiring this mowing schedule for all areas where native, herbaceous species are established.

RJOC-1: These areas are proposed as lawn by the Landscape Architect to allow for vehicle overhang over the curbing without resulting in degradation of higher growing ground species.

BETA2: The Applicant could explore the establishment of low-height, native vegetation within this area that would be compatible with the adjacent parking. Comment remains.

RJOC-2: The Landscape Plans have been revised to remove the grass strip south of Building #2 and extend the meadow mix to the curb in this area.

W15. The Applicant proposes restoration of Buffer Zone and disturbed BVW within several areas across the Site. The narrative notes that seed should be applied to "clean bare soil" in Buffer Zone restoration areas and does not specify any details regarding the preparation of the BVW restoration areas. It is recommended that the Applicant clarify if full tillage is proposed in all restoration areas; if so, additional erosion controls should be provided at the downgradient limits of disturbance.

RJOC-1: The applicant is proposing to till and seed the existing disturbed wetland areas. The areas will be covered with straw matting immediately after seeding for erosion and sediment control until stabilization occurs.

BETA2: Comment not addressed. Additional erosion controls have not been provided at the downgradient limits of disturbance. This will protect the adjacent, undisturbed BVW until vegetation is established within the restored areas.

RJOC-2: The plans have been revised to include additional erosion controls at the downgradient limits of disturbance.

Bordering Vegetated Wetland (310 CMR 10.55)

W18. Provide depth to groundwater within the replication area to demonstrate that the proposed grading will result in Estimated Seasonal High Ground Water (ESHGW) levels occurring within 12 inches of the final surface elevation.

RJOC-1: It is expected that the proposed elevations will result in ESHGW to be within 12 inches of final grade based upon existing grades and observations of the adjacent wetlands. The applicant suggests that soil testing to verify ESHGW elevation be performed at the time of the installation of the temporary sediment basin in this area. If testing reveals that the ESHGW will not be within 12" of the final surface elevation, but only minor elevation modifications are necessary, then field adjustments will occur at the time of construction under the supervision of the Wetland Scientist and/or Civil Engineer (with notification to the Conservation Agent). If significant modifications are necessary, the area shall be redesigned by the Wetland Scientist and/or Civil Engineer and submitted to the Conservation Department for review.

BETA2: The Commission could consider a Special Conditions in the OOC that requires verification of ESHGW be provided to the Conservation Commission or its Agent prior to construction of the wetland replication area to confirm sufficient hydrology is present.

RJOC-2: Sheet C-2C has been revised to include Note #3 within the General Wetland

Replication Notes requiring verification of ESHGW within the wetland replication area.

STORMWATER MANAGEMENT REVIEW

SW1. The base of the proposed retaining walls along western extent of each building will be far below existing grade and it is anticipated that blasting will be required to achieve this depth based on test pits logs within 25 feet of the BVW. As a result, significant groundwater inputs from the adjacent BVW are anticipated. There are no construction details provided for these walls; however, they are shown on the detail sheets as being segmented block walls.

Since the walls will allow free passage of water throughout a majority of the blocks, groundwater flow will impact the capability of the downgradient subsurface infiltration systems from functioning in accordance with the Standards. In addition, the Applicant should disclose the limits of work and potential BVW and groundwater impacts associated with the blasting (fracturing of bedrock).

RJOC-1: Cross-section details of the walls in the earth cut areas have been provided on Sheet C-15. The grading at the rear of Building 1 has been revised to raise the parking area and reduce the cut in that area. The excavation for the installation of the wall will include a geosynthetic clay liner on the face of the cut slope prior to backfilling with the existing soil. The clay liner will extend below proposed finish grade a nominal distance as a means to restrict the flow of water through the wall. The earth cuts in these areas will be 8 to 10 feet maximum. Based on the available soil test pits the shallowest rock appears to be at or about the same depth or deeper. No significant blasting will be required that will fracture bedrock, and we do not anticipate any adverse impacts to groundwater.

BETA2: There is no test pit data provided behind Buildings No. 1 or 2 to support the assumption that no significant blasting will be required. A majority of the deeper test pits are located within the valley close to the wetlands edge, where these geologic conditions are expected. BETA does not believe that the clay liner will effectively eradicate all the groundwater issues at the subdrains behind the proposed walls. Other design options inside the 50-foot Buffer Zone behind Buildings No. 1 & 2 requiring less blasting, or no blasting, should be presented to the Commission to minimize the likelihood of hydrologic impacts the adjacent wetlands. Alternatively, the Applicant should provide credible data that supports that no blasting is required under the current design. In addition, BETA recommends that all subdrain outlets be identified and located to ensure that they do not discharge towards the proposed infiltration BMPs.

RJOC-2: Per discussion at the May 2, 2024 Conservation Commission Hearing, a note has been added to Sheets C-1A and C-1B stating that "ledge removal methods within 50 feet of the wetlands around Buildings 1 and 2, if any, to be performed by mechanical means that can include: hoe ramming, line drilling with hoe ramming, or microblasting with charges no greater than one quarter pound"; Locations of underdrain outlets have been added to Sheets C-2A & C-2B and Note #13 has been added to Sheet C-2B stating that "No underdrain/subdrain shall be connected to any stormwater infiltration BMP."

SW3. In accordance with Volume 2, Chapter 2 of the Handbook, all subsurface structures must have an appropriate number of observation wells to monitor the water surface elevation and serve as a sampling port. In addition, each must have an entry port to allow worker access for maintenance. Provide the required observation wells and entry

ports.

RJOC-1: Notes have been added to each of the subsurface chamber systems (infiltration and detention) details, on Sheets C-8 and C-9, stating that a minimum of 4 inspection ports shall be installed per system (to be set at 4 corners of each system). Additionally, a note has been added to each of the subsurface corrugated metal pipe infiltration system details, on Sheet C-8, stating to "provide observation manholes with 24-inch covers at all corners and inlet/outlet pipes". These observation ports and manholes will provide access for monitoring and cleaning of the systems.

Details have been provided, on the detail sheets of the revised plan set, for both the observation ports and access manholes.

BETA2: A detail for the observation risers is not shown. The access manhole detail on Sheet C-7 is specific to the pipe infiltration systems only. Show all proposed observation risers in the plan view.

RJOC-2: The observation port detail on Sheet C-8 has been revised to depict the observation riser pipes; Locations of all the proposed observation ports have been added to Sheets C-2A & C-2B, and the symbol has been added to the legend.

SW4. Subsurface infiltration systems 1, 2, & 6 are located 5 to 15 feet upgradient of a stormwater basin. In each case, the water surface elevation in the basin during a rainfall event will be above the bottom of the subsurface infiltration system. This standing water is likely to raise groundwater levels above the bottom of the infiltration systems and restrict the ability of the systems to infiltrate. The Applicant should revise the design accordingly.

RJOC-1: Stormwater basins downgrade of subsurface infiltration systems 2 and 6 have been eliminated and the stormwater calculations have been revised accordingly. Stormwater Basin-1 (SWB-1) has been reviewed and the peak stormwater elevation is below the nearby infiltration system. The peak elevation within SWB-1 is 289.85 in the 100-year design storm and the bottom of stone elevation of subsurface infiltration system-1 (PSIS-1) is 295.70, therefore a 5.85' separation is provided from peak SWB-1 elevation to bottom of stone elevation of PSIS-1. Therefore, the SWB-1 is still being proposed as part of the drainage design.

BETA2: Based on the detail for PSIS-1, the top of the system is above the proposed grade. The proposed elevations for PSIS-1 or the grades above the system should be modified to provide the cover needed for the pavement. Regardless, Stormwater Basin 1 will impact groundwater levels below PSIS-1. BETA recommends that a mounding analysis be conducted for PSIS-1 with the assumed groundwater level at the spillway crest of Stormwater Basin 1.

RJOC-2: The proposed elevation for PSIS-1 has been revised to provide the proper cover needed for the pavement; A groundwater mounding analysis has been performed for PSIS-1 with the requested assumed groundwater level (See Attachment #1). The groundwater mounding analysis depicts that the standing water within Stormwater Basin 1 will not restrict the ability of PSIS-1 to infiltrate and provide proper separation from groundwater.

SW6. Provide monitoring wells and emergency low level outlets within all stormwater basins per the Handbook.

RJOC-1: An emergency low level outlet has been provided in the surface stormwater basin (SWB-1), and a note has been added to the detail on Sheet C-7 stating that a

monitoring well shall be installed. The proposed location of the monitoring well has been provided on Sheet C-2A.

BETA2: BETA recommends that the monitoring well be shown in plan view.

RJOC-2: The location of the monitoring well has been depicted on Sheet C-2A and the symbol has been added to the legend.

SW9. The designer is assuming a total suspended solids (TSS) Removal Rate of 80% for all proprietary separators being used. According to Environmental Protection Agency (EPA) studies, these separators are only 40-45% effective. Generally, these systems proposed in Franklin have only been allowed for use as a final treatment in redevelopment situations where the existing stormwater collection system is being maintained. The TSS removal rate should only be 44% for all proprietary separators in the TSS removal calculations in the report.

RJOC-1: The TSS calculations have been revised to use a removal rate of 44% for all proprietary separators and the resulting calculations reflect full compliance with the regulations.

BETA2: Based on the proposed use of the proprietary separators for pretreatment, all the proposed discharges will meet the requirement for 80% TSS removal required under the Standards. However, the total TSS Removal provided by the development will not be 92% as reported. A separate TSS removal calculation should be presented for each discharge point. The designer should also note that the required pretreatment cannot be used in the calculations for the total treatment provided by the train.

RJOC-2: The TSS removal calculation trains have been revised per BETA comment; Separate TSS removal calculations have been provided for each discharge point within the revised Stormwater Management Report.

MASSDEP STORMWATER

STANDARDS

BETA2: The nomographs are provided; however, the D_{50} for each of the outfalls was not plotted. Complete the analysis and document that the rip rap size proposed is within the design conditions for Figure 1 of the appendix.

RJOC-2: The D_{50} for each outfall has been plotted on the nomographs and are provided within the revised Stormwater Management Report; Additionally, the detail for the Flared End Section with Stone Apron on Sheet C-7 has been revised to include the D_{50} size.

POST-DEVELOPMENT PEAK DISCHARGE RATES (STANDARD NUMBER 2):

SW15. The time of concentration (Tc) calculations for the existing conditions analysis are understated. As correctly noted in the report, Tc should be based upon the longest ***time*** of travel, not necessarily the longest distance. BETA recommends that the Applicant reassess flow paths, especially for the initial sheet flow path and slope.

RJOC-1: The Tc calculations for the existing conditions have been reviewed and minor adjustments have been made to the hydrologic analysis model within Appendix B of the revised stormwater report.

BETA2: BETA recommends that the designer review the paths again for the two existing watersheds towards DP-2 and DP-3. Compliance with Standard 2 is close and minor changes in the Tc could influence the design conclusion.

RJOC-2: RJOC has performed another review of the Tc paths within these two watersheds; All other possible paths had quicker times of concentration, therefore RJOC has maintained the Tc paths of the previous submittal.

SW16. The use of curve number (CN) values associated with hydrologic soil group (HSG) D within the central portion of the Site should be limited to areas of BVW. Several of the test pits performed in this area indicate that soils are classified as HSG A.

RJOC-1: The limits of designated HSGs used in the stormwater analysis are based upon the National Resources Conservation Services (NRCS) online web soil survey. These HSG designations provide estimates of runoff potential from the upper soils as described in the Massachusetts Stormwater Handbook Volume 3: Chapter 1, Page 13:

"For undisturbed soils in Massachusetts, NRCS has assigned each soil type to a Hydrologic Soil Group. However, that classification is based on the upper and not lower soil horizons."

The onsite soil testing performed by RJOC, which yielded a Sand or Loamy Sand, HSG A soil, was required to determine the soil texture in the lower soil horizons (parent material) for infiltration system design. This does not represent the runoff potential from the upper soil horizons when calculating site hydrology. Therefore, the NRCS HSG designations, as depicted on the web soil survey, were used for determining the CN values for the analysis of stormwater runoff.

BETA2: The Ridgebury soils series are listed as HSG-C by Plymouth County. In addition, the description of the series by NRCS states that depth to dense till commonly is 36-49 cm and that "they normally occur in drainageways in uplands...". Each of these descriptions fits the wetlands through the site and none of the test pits outside the limits of the wetlands confirm the presence of dense till. Comment remains.

RJOC-2: Franklin is located within Norfolk County, the Ridgebury soil series are listed as HSG-D per the NRCS Maps for Norfolk and Suffolk Counties. However, the applicant has decided to revise the calculations in the manner requested by BETA. The HSG-D has been removed from the HydroCAD analysis and is only assumed to be within the wetland limits. The drainage design was slightly modified to adjust outlet control elevations and size of PSDS-3 to ensure the design would remain in compliance with the Massachusetts Stormwater Standards. The stormwater management report has been revised to reflect the HydroCAD revisions, along with associated calculations revisions to draw-down and recharge volume.

SW18. There is no opportunity for maintenance for the subsurface detention systems. Since they are lined with no opportunity for infiltration, the storage volume is critical to their success in meeting this Standard. Although the flow into these systems is treated by proprietary separators, their limited capabilities based on the EPA's analyses indicate that the sediment which flows through these systems from the pavement areas will impact overall storage capacity over time. BETA recommends that the Applicant review the design and find alternative above-ground means of providing storage to attenuate peak flow rates, which can be effectively maintained long-term.

RJOC-1: The subsurface detention systems will be maintained in the same manner as the subsurface infiltration systems, as noted in the O&M within Appendix E of the revised stormwater report. Monitoring of the systems for any sediment accumulation will be performed through the observation ports in the systems. As noted above, the flows are treated using deep sump catch basins and proprietary separators to remove 58% TSS prior to entering these systems. In the event there is sediment observed within the system of more than 3" of average depth, maintenance will occur through the

observation ports. The maintenance is accomplished using a high-pressure water nozzle in an observation port to suspend the sediments and then the vacuuming of the water and sediments through an adjacent observation port to remove the sediments. Sewer and pipe maintenance companies have vacuum/Jet Vac combination vehicles to perform this maintenance.

BETA2: As documented by the EPA, the proprietary separators have difficulties with suspended solids which will tend to fill the voids in the stone. To ensure that the suspended solids do not impact the voids in the underlying stone, BETA recommends the use of a filter fabric wrap around the inlet row in the system. It is referred to as an "*Isolator Row*" by Storm Tech. This will ensure that the suspended solids remain in the first row and can be vacuumed as noted.

RJOC-2: The design of the proposed subsurface detention systems (PSDS) has been revised to incorporate Isolator Rows for the inlet rows of each system. Note #1 has been added to each PSDS detail indicating that an Isolator Row shall be installed on the inlet rows and a Typical Isolator Row detail has been provided on Sheet C-9.

RECHARGE TO GROUNDWATER (STANDARD NUMBER 3):

SW19. In accordance with the Handbook, 2 test pits are required within the footprint of each proposed infiltration system. Additional test pits are required within the footprint of 5 of the subsurface infiltration systems to meet this requirement.

RJOC: After the reconfiguration of the drainage design noted previously, a minimum of 2 test pits are provided within the footprints or within reasonable proximity of all infiltration systems. For Stormwater Basin-1, PSIS-2 and PSIS-7 there has been extensive soil investigation in the area, as outlined below:

- *PSIS-2: 1 test pit within the system and 3 additional within 50' of the system.*
- *PSIS-7: 1 test pit within the system and 2 additional within 15' of the system.*
- *SWB-1: 4 test pits within 30' of the bottom of the basin.*

RJOC believes the soil testing performed in close proximity to each of these systems provide evidence that the soil types and groundwater elevations used in the design as accurate.

BETA2: Based on the revised configuration of the infiltration BMPs, BETA agrees that no additional soil testing is required for the design. However, BETA offers the following regarding PSIS-3:

- **The description for TP-7 states that ESHGW was established by the soil evaluator based on the depth to weeping. However, in TP-8, redoximorphic features were observed with no weeping visible. In each test pit, the C Horizon is described as sand. Due to the lack of redoximorphic features in TP-7, BETA recommends that a *Frimpter* adjustment be conducted for this ESHGW determination.**

RJOC-2: The Frimpter Method has been used to determine the ESHGW elevation adjustment within Test Pit-07 (See Attachment #2). This resulted in need to raise the elevation of PSIS-3 by 0.2' to maintain the required separation from groundwater. Additionally, the system was shifted slightly southwesterly to ensure the proper cover is maintained to the finished grade of pavement above the system.

Please call me if you have any questions at 781-279-0180.

Sincerely,

RJO'CONNELL & ASSOCIATES

Michael A. Capachietti, EIT
Project Designer

Att: As noted.

ATTACHMENTS:

Table of Contents

Attachment 1:

Groundwater Mounding Analysis (PSIS-1/SWB-1)

Memorandum

Date: May 10, 2024

To: Town of Franklin Conservation Commission

From: RJ O'Connell & Associates, Inc.

Regarding: Groundwater Mounding Analysis (PSIS-1/SWB-1)
121 Grove Street
Franklin, MA

GROUNDWATER MOUNDING ANALYSIS

Per BETA Group Inc's Peer Review letter, dated May 1, 2024, Comment SW4 requests a mounding analysis is to ensure Proposed Stormwater Basin-1 (SWB-1) does not have an impact on the groundwater levels below Proposed Subsurface Infiltration System-1 (PSIS-1). A mounding analysis was performed in accordance with Volume 3, Chapter 1 of the Massachusetts DEP Stormwater Standards to demonstrate:

1. The Required Recharge Volume is fully dewatered within 72-hours; and
2. The groundwater mound that forms beneath the recharge system will not break out above the land within the 72-hour period.

The mounding analysis was performed using the Hantush Method and excel spreadsheet provided by the USGS website. For conservative purposes, the dynamic infiltration rates used in the mounding calculations are based on the infiltrated volume of the 100-year storm event (as depicted on the HydroCAD summary page following the mounding calculation as "discarded volume"). Additionally, as requested by BETA, the elevation at the spillway crest of SWB-1 (289.5) has been used as the assumed groundwater elevation.

The following are the general parameters utilized for the analysis:

R = dynamic infiltration rate (in feet/day)

$$R = \left(\frac{volume\ exfiltration\ (cf)}{basin\ bottome\ area\ (sf)}\right)/\text{time of drawdown (days)}$$

$$R = \left(\frac{18{,}532\ cf}{3{,}427\ sf}\right)/3 \text{ days}$$

R = 1.80 ft/day

Sy = specific yield

Sy = 32% (based on Morris and Johnson 1967 list for medium sand)

K = horizontal hydraulic conductivity (in feet/day)

K = 165.4 ft/day (constant in calculation for sand)
Based on converting the Rawls rate (vertical conductivity) for the systems of 8.27 inches per hour into feet per day. SIR 2010-5102 for groundwater mounding estimates horizontal hydraulic conductivity as a 10:1 ratio from vertical hydraulic conductivity.

X = ½ the length of system

X = 15.84’

Y = ½ the width of system

Y = 54.09’

t = duration of infiltration period (in days)

t = 72 hours = 3 days

hi = initial thickness of saturated zone (in feet)

hi = assumed to be from bottom of stone of PSIS-1 (293.67) to the spillway crest of SWB-1 (289.5)

hi = 4.17’

The resultant groundwater mounding peaked at 1.9 feet above the elevation at the spillway crest of SWB-1 to elevation 291.4. The bottom of the infiltration system is proposed at elevation 293.67, providing a 2.27’ separation from the bottom of PSIS-1 to the assumed groundwater mound and will not restrict the ability of the system to infiltrate.

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

inch/hour	feet/day
0.67	1.33
2.00	4.00

hours	days
36	1.50

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).

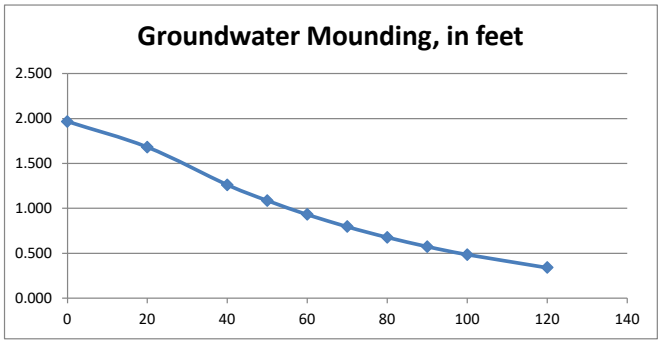
Input Values

1.8000	***R***	**Recharge (infiltration) rate (feet/day)**
0.320	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
165.40	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
15.840	**x**	**1/2 length of basin (x direction, in feet)**
54.090	**y**	**1/2 width of basin (y direction, in feet)**
3.000	**t**	**duration of infiltration period (days)**
4.170	**hi(0)**	**initial thickness of saturated zone (feet)**

6.137	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
1.967	**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
1.967	0
1.682	20
1.261	40
1.086	50
0.932	60
0.796	70
0.677	80
0.574	90
0.484	100
0.340	120

Re-Calculate Now



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.

Attachment 2:

Frimpter Method ESHGW Adjustment for Test Pit-07

Memorandum

Date: May 10, 2024

To: Town of Franklin Conservation Commission

From: RJ O'Connell & Associates, Inc.

Regarding: Frimpter Method for Test Pit-07
121 Grove Street
Franklin, MA

FRIMPTER METHOD ESHGW ADJUSTMENT FOR TEST PIT-07

Per BETA Group Inc's Peer Review letter, dated May 1, 2024, Comment SW19 requests that a Frimpter Method ESHGW adjustment is conducted for Test Pit-07 due to lack of redoximorphic features during the onsite soil testing observations. The Frimpter Method analysis is typically utilized if test pits were not performed during the months where high groundwater is anticipated (March-April) and an adjustment to observed groundwater outside this period is required.

The Frimpter Method was performed for Test Pit-07 in accordance with the calculations outlined within "The Probable High Ground-Water Levels in Massachusetts", written by Michael H. Frimpter and the information provided Massachusetts Department of Environmental Protection to demonstrate:

The index well selected for correlation was USGS well No. 420544071173701 in Norfolk, Massachusetts. The index well is near the Site and is in a similar landform as Test Pit-07.
Given the location of Test Pit-07 at the low point of the site and the surrounding wetlands, a valley flat landform has been used for this calculation. Figure 12 from the Frimpter Report identifies that Sites in Massachusetts with sand and gravel in valley flats have water level ranges that vary from 2-feet to approximately 4.3-feet. Approximately 5% of Sites containing sand and gravel in valley flats have water level ranges that exceed 4.2-feet (S_R=4.2). (Figure 12 from the Frimpter Report is attached).

The Frimpter Method utilizes the following equation and variables to determine the probable high-water level at the Site (S_H):

$$S_H = S_C - (S_R / OW_R) \times (OW_C - OW_{MAX})$$

Where:

S_H = Probable high-water level at the Site
S_C = Measured depth to water at the Site

8.42 ft (soil testing performed on October 24, 2023)

S_R = Range of water level where the Site is located.

4.2 ft (sands and gravels in valley flats - Figure 12)

OW_R = Recorded upper limit of annual range of water level at the observation well which is used to correlate with water levels at the Site.

4.09 ft (USGS well No. 420544071173701 - Norfolk, MA)

OW_C = Measured depth to water in the observation well which is used to correlate with water levels at the Site.

6.15 (USGS well No. 420544071173701 - Norfolk, MA on October 24, 2023)

OW_{MAX} = Depth to recorded maximum water level at the observation well which is used to correlate with the water levels at the Site.

3.6 (USGS well No. 420544071173701 - Norfolk, MA)

To estimate the depth of probable high-water level within Test Pit-07, the S_R value from Figure 12, "Probability of water level range in sand and gravel in valley flats" was utilized, yielding a S_R value of 4.2 the resulting S_H value is calculated to be 5.8 feet (70 inches) below the ground surface, as illustrated below:

$$S_H = 8.42 - (4.2 / 4.09) \times (6.15 – 3.6)$$

$$S_H = 5.8 \text{ ft (70 inches)}$$

Given the existing grade of the site at Test Pit-07 (281.5) the Frimpter Method yields an estimate seasonal high ground water elevation of 275.7.

(See attached documentation for determination of variables.)

Test Pit Log

Project	121 Grove Street	Job Number	22016
Location	121 Grove Street	Date	10/24/2023
City, State	Franklin, MA	Weather	Partly Cloudy / 47° F
Property Owner	Fairfield Residential Company, LLC	Lat., Long.	

Contractor	Canesi Brothers Construction, Inc.	Groundwater Observations			
Excavator	Bill	Observed	Depth	Elevation	Notes
Logged by	Drew Gallant (SE# 14482)	Redox	N/A	273.1	Weeping @ 101", Standing @ 113"
Reviewed by		S_C = 8.42'			
Surface Elevation	281.5	Observed	Depth	Elevation	Notes
Test Pit ID	TP-07				

				Redoximophic Features			Coarse Fragments % B.V.				
Depth	Soil Horizon	Soil Texture	Soil Matrix	Depth	Color	%	Gravel	Cobbles & Stones	Soil Structure	Soil Consistence	Other
0-10"	Ap	SL									
10-23"	Bw	LS									
23-121"+	C	Sand									

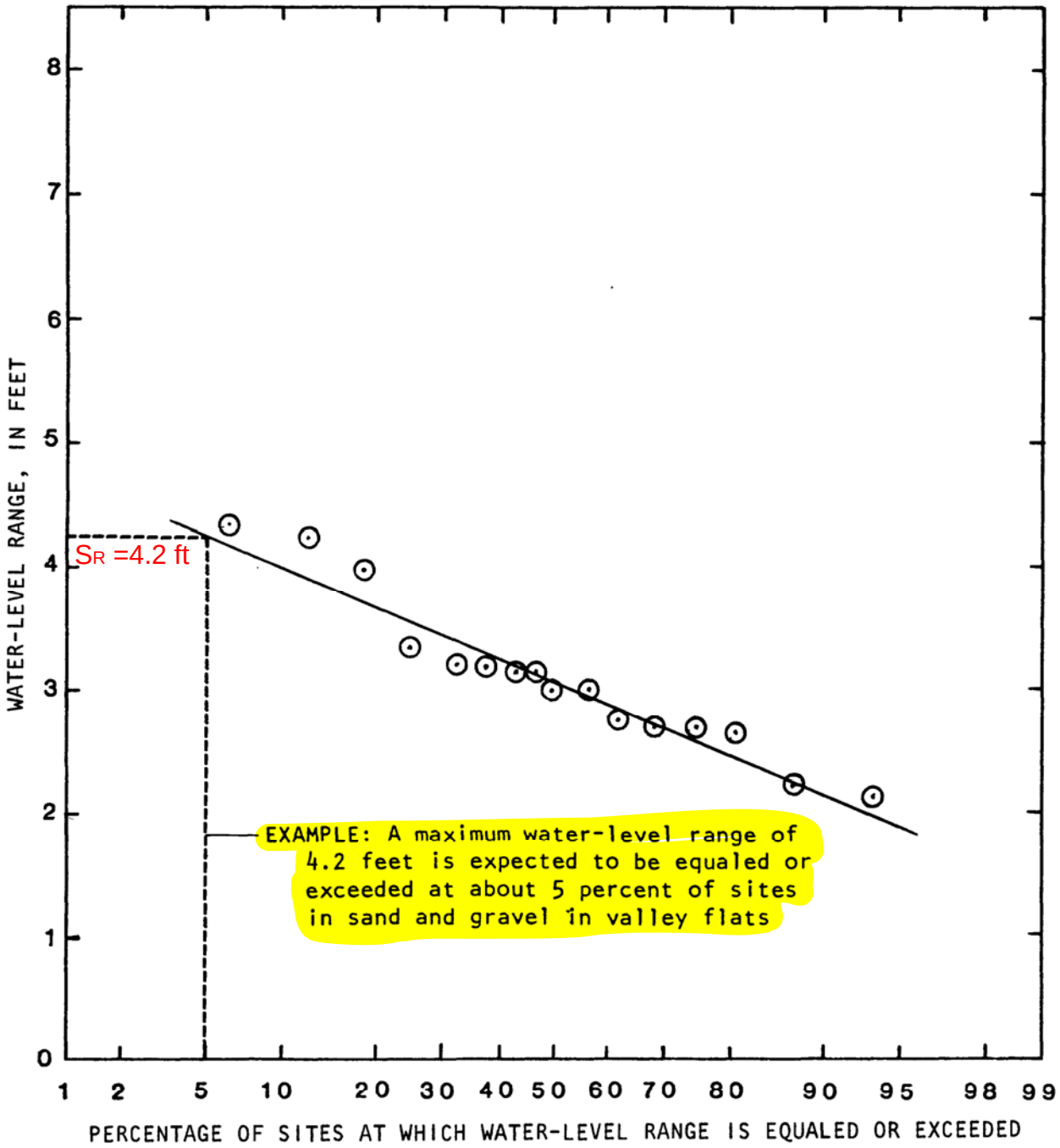


Figure 12.--Probability of water-level range in sand and gravel in valley flats

MENU

Important for you to know:

- New to WDFN: customize and keep track of your list of favorite monitoring locations and data types using the new My Favorites page. To learn more, read our announcement on our Water Data for the Nation blog.

IMPORTANT Legacy real-time page

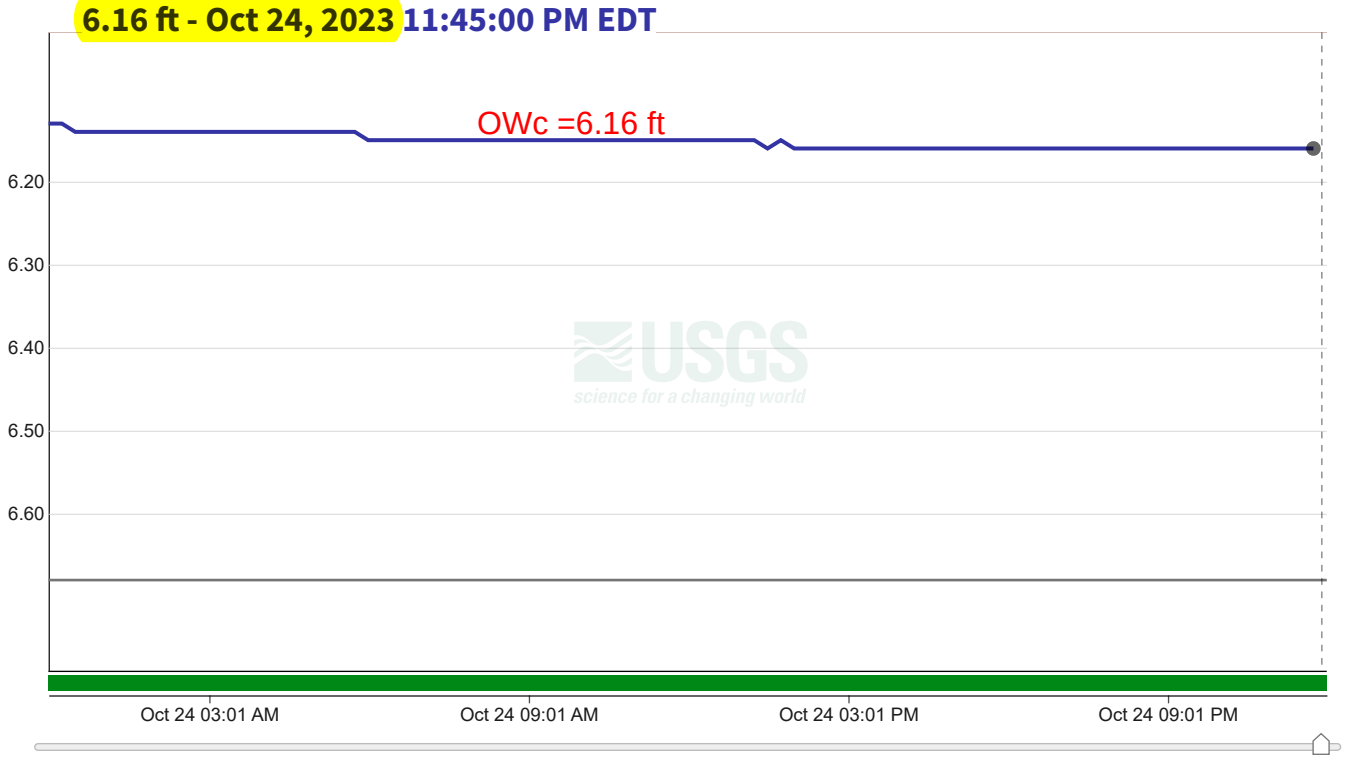
7 days 30 days 1 year

- using custom time span -

Ma-nnw 27R Norfolk, MA - 420544071173701

October 24, 2023 - October 24, 2023

Depth to water level, feet below land surface



IMPORTANT Data may be provisional

Show legend

Questions or Comments

tus

Statistics for use in estimation of high groundwater levels, [Values in feet below land surface datum, OwMax, highest measured groundwater level; OWr, maximum annual range. *, site c

Site_Number	Station Name	Setting	Aquifer Type	Start date	Start Date (daily data)	Lowest water level	OwMax	OWr
422627071154002	MA-LTW 104 LEXINGTON, MA	Valley Flat	Stratified Drift	1964-12-01	2023-04-07	4.35	-0.05	3.81
413525070291904	MA-MIW 29 MASHPEE, MA	*	Stratified Drift	1976-02-04	2022-09-15	10.03	5.53	3.66
415433070583302	MA-MTW 82 MIDDLEBORO, MA	Till	Glacial Till	1964-12-01		17.58	1.5	15.49
411555070021901	MA-NBW 228 NANTUCKET, MA	*	Stratified Drift	1976-03-04	2022-03-31	27.9	20.51	4.7
424520070562401	MA-NIW 27 NEWBURY, MA	Till	Glacial Till	1959-07-01	1984-10-17	12.68	1	10.2
420544071173701	MA-NNW 27R NORFOLK, MA	Valley Flat	Stratified Drift	1964-12-01	2001-08-10	8.35	3.6	4.09
420610071421402	MA-NXW 54 NORTHBRIDGE, MA	Valley Flat	Stratified Drift	1984-08-21	2017-09-01	5.14	2	2.82