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MEMORANDUM

Date: November 14, 2016

Project: 269 North Avenue, Weston, Massachusetts

Project #: DEI #2013-0008

Distribution: Weston Zoning Board of Appeals

From: Doyle Engineering Inc.

Regarding: Response to Cambridge Water and Tetra Tech Comments

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This memorandum contains responses to comments, information and calculations, original comments are represented in normal font while responses are indicated in **Bold**.

Cambridge Water Department Comments November 1, 2016

1. TSS removal calculation worksheet lists leaching catch basins and subsurface infiltration systems for the treatment BMPs. However, the plans and report text indicate that the treatment train consists of deep sump hooded catch basins, water quality inserts, and subsurface infiltration systems. The calculation sheet should be updated to reflect the actual treatment onsite.

   The project has been revised to include Stormceptor inserts in all of the catch basins which are designed to provide 94% TSS removal. In addition the stormwater mitigation measure to control rate in volume is to infiltrate 100-percent of all the stormwater.

2. TSS removal calculation sheet is missing for the catchment P-3, the area downstream of the infiltration basins.

   All catchment areas are directed through a Stormceptor inlet and an infiltration system. The Stormceptor design sheets indicating the removal rates are attached to the drainage report.

3. Text describing catchment P-3 references a detention basin east of Building A. This detention basin was not shown on the plans provided.

   The plans and calculations have been revised.

4. The Utilities plan references a septic system design plan titled “Subsurface Sewage Disposal System – New Construction, 269 North Ave., Weston, MA.” CWD does not have a copy of this plan which is needed to verify distance to groundwater from the septic system.

The septic plan will be provided.

5. Stormwater Management Standard 6 is relevant to the site given the potential for reconnecting the 18" drainage pipe and the outfall from North Ave into Stony Brook. The text in section 3.0 of the Post-Construction Stormwater Management Report should be updated accordingly. Given that the site discharges to an Outstanding Resource Water, CWD requests that the long term management plan for the site comply with Stormwater Management Standard 6 and prohibit the use of sodium-based deicers. Sand, calcium chloride, or a sand/calcium chloride mix are examples of preferred deicing compounds. Regardless of the deicer used, the amount of material applied should be minimized to protect water quality.

   The drainage report has been revised to acknowledge the ORW. Upon approval of the project, a final Operation and Maintenance Plan will be submitted to the Cambridge Water Department for review.

6. Section 3.0 of the above mentioned report (Stormwater Standard 9) says that an Operations and Maintenance Plan (O & M) was included with the report. However, CWD did not receive a copy of the plan to review.

   Upon approval of the project, a final Operation and Maintenance Plan will be submitted to the Cambridge Water Department for review.

7. CWD also requests that the proponent provide calculations demonstrating 65 percent phosphorous removal, per the Upper/Middle Charles River Total Maximum Daily Load (TMDL) recommendations.

   The project has been revised to include Stormceptor inserts in all of the catch basins which are designed to provide 94% TSS removal. In addition the stormwater mitigation measure to control rate in volume is to infiltrate 100-percent of all the stormwater. Infiltration basins are expected to remove 100% of total Phosphorus.

<u>Significant Tetra-Tech Comments from October 26, 2016 Letter</u>

10. The stormwater analysis has used a more restrictive underlying soil condition for pre-development conditions than supported by both NRCS soil mapping and on-site percolation tests. NRCS soil mapping clearly indicates underlying soils are classified as Hydrologic Soil Group A (HSGA) which are considered the most highly permeable soils. This classification is generally confirmed by test pit and percolation testing performed on the site which uniformly indicates underlying soils with percolation rates exceeding 5 min/in. By using a lower soil permeability factor the analysis overestimates existing site runoff thereby setting a substantially lower mitigation standard.

    The underlying soils are HSG A, soil testing was conducted at the site and all of the tests conducted in the area of the retention basins revealed soils that could not be soaked and that had percolation rates faster than 2 minutes per inch.

11. The analysis neglects to consider the full extent of the existing depression both vertically and horizontally. Underestimating the size of the depression will yield much higher pre-development runoff rates than actually exist. Grading plans provided by the applicant and included in the drainage study clearly show the 130-foot contour extending into abutting properties north of the site and encompassing an area of roughly one (1) acre. The analysis indicates a depression surface area of only 11,356 square feet which is approximately 25% of the actual area. Additionally analysis assumes a depression bottom at elevation 128 likely based on the area bounded by the 128-foot contour on the existing conditions plan. However existing conditions information provides only a 2-foot contour interval allowing for the possibility that the actual bottom of the depression could be as much as two feet lower than considered which would significantly increase on-site recharge to groundwater and reduce runoff from the site.

    The grading in the area of the low point has been modified to include the 127, 128, 129 and 130 contours based on spot grade information from the on the ground survey as well as from recent plans developed for the property at 277 North Avenue.

12. The analysis includes drastically inconsistent infiltration rates for the pre- and post-development conditions. Design guidance clearly requires exfiltration rates be set based on underlying soil characteristics and not by surficial layers installed as part of the infiltration system. In this case, the underlying soil conditions are the same for the pre-development condition and post-development condition since the underlying soils will remain in place. The analysis does not follow this common practice and instead uses a low pre-development exfiltration rate of 1.65 in/hour which is not consistent with test pit and soils information for the site and does not correspond to any of the Rawls Rates included in the Massachusetts Stormwater Handbook. Post-development analysis uses an infiltration rate of 8.27 in/hour which corresponds the highest Rawls Rate. There is no credible reason that post-development infiltration rates should be modeled at a rate five (5) times higher than pre-development conditions.

    The infiltration rates are consistent. Design Guidance requires that infiltration systems be designed to account for the most restrictive soil layer. In the case of 269 North Avenue, when determining the existing condition, the topsoil is the most restrictive layer. Based on the soil testing at the site and the NRCS soil survey, the topsoil at the property is the most restrictive layer and that soil is classified as a sandy loam which has a Rawls number of 1.02. To be conservative, the Rawls number of 2.41 for Loamy Sand was used in the calculations.

    In Tetra-Tech Comment #10 above the reviewer accurately acknowledges that the underlying soil is more permeable. Actual soil testing at the property revealed a gravely sandy soil that has a percolation rate that is faster than 2 minutes per inch, the closest Rawls number for this material is for sand with a rate of 8.27 in/hour.

13. The stormwater analysis continues to model the infiltration systems independently despite the systems being connected by a relatively large diameter culvert. These systems operate as one infiltration system and should be modeled as such to ensure accurate results.

Although it is sometimes efficient to model two systems in this configuration as a single system, the two infiltration systems for this project are modeled separately because they are in fact two separate systems connected by a culvert. The culvert has an effect on how the system functions. By modeling the system as a single system the effect of the culvert would not be accounted for and inaccurate results would be provided. The entire system is designed to consider the tailwater effect of the water flowing through the entire system.

14. CB 210 is one foot higher than the rim at DMH 202. Water will discharge from DMH 202 before reaching the discharge elevation at CB 210. Additionally, grading at the location of CB 210 is unclear and appears to direct flow toward Building B. If any discharge is proposed at this location the plans should provide clear detail on how the discharge will be controlled in a manner that does not impact the abutting property or the adjacent sidewalk.
    This area has been revised to eliminate the discrepancies.

15. The analysis still fails to account for significant head losses resulting from flow through what is a closed water system and does not accurately model the infiltration systems. Given the reliance on water surface profile to drive flow through the system an analysis of the hydraulic grade line must be performed to accurately assess flooding impacts upstream. The hydraulic grade line considers the energy required to move water through a closed system. Any increase in the post-development hydraulic grade line on abutting properties would indicate increased flooding. The hydraulic grade line analysis should also consider the likelihood that system capacity will be adversely impacted by accumulation of sediments in the recharge system and connecting pipe network.

    The design has been developed to consider the tailwater effects on the system which accounts for the head losses through the system. See response to Comment #13 above regarding modeling the two infiltration systems and the culvert separately.

17. The plans still provide only 2-foot contours which does not provide adequate detail needed to support the proposed design for reasons previously described.

    The plans have been developed based on Section C.2.d.ii.1 and C.3.d.ii.4 of the Town of Weston Stormwater regulations that states, "The site's existing topography with contours at 2 foot intervals for work area." Additional detail has been provided where appropriate and where requested.

18. Proposed grading is still shown touching the property line in several locations which does not consider the space required for installation and maintenance of required erosion control measures. Proposed grading should be modified to allow adequate space for execution without impacts to abutting properties or easements should be secured from impacted parties. This is of particular concern now that the proposed infiltration systems are five (5) feet deeper than originally proposed.

    The proposed contours have been pulled back to three feet from the side property lines except where fine grading needs to occur to connect to the existing contours along the property line of

277 North Avenue. The proposed infiltration systems are located approximately 15-feet from the side property boundaries

25. Updated soil test pit data provided on the plans suggests that estimated seasonal high groundwater (ESGH) can be determined based on the lack of visible redoximorphic features (mottles). This is not true and particularly in cases where underlying soils have very high permeability as are present on this site and when observations are made out of season and during periods of drought. Title 5 of the State Environmental Code (310 CMR 15.103(3)) provides acceptable methods for establishing ESGH in the absence of redoximorphic features and indicates accepted methods clearly. Additionally, plans indicate a depth to seasonal high groundwater of 14-15 feet in the area of the proposed infiltration systems. However this is inconsistent with findings in test pits TP-11, TP-12 and TP-13 which are at higher elevation and in similar soils yet visible soil mottles indicate shallower seasonal high groundwater depths of 12-13 feet. One would normally expect groundwater depths to decrease as you approach the surface water. Given the importance of ESHG to the functionality of the infiltration system we request the applicant determine ESHG using one of the approved methods listed under section 310 CMR 15.103(3).

Test pits TP #11, #12 and #13 were conducted high on the hill in the steepest part of the slope where bedrock was encountered. The test pits in the area of the infiltration systems were conducted in the low flat area of the site. In all of the test pits where water was encountered, the mottling was clear, distinct and consistently approximately one-foot above the bedrock. There were no mottles discovered in the test pits at the location of the infiltration basins neither was there any bedrock encountered. It is reasonable to conclude that groundwater is below the elevation of the bottom of the lowest test pit conducted in the area of the infiltration basin.