



To: Zoning Board of Appeals
Town of Winchester
71 Mt. Vernon Street
Winchester, MA 01890

Date: November 22, 2019

Memorandum

Project #: 14773.00

From: Rachel Luna, PE 
Luke Boucher, PE
Jake San Antonio, PE 

Re: 19-35 River Street Comprehensive Permit - Stormwater, Drainage,
and Hydraulic Peer Review

At the request of The Town of Winchester Zoning Board of Appeals (the "Client"), Vanasse Hangen Brustlin, Inc ("VHB") conducted a peer review of stormwater, drainage, and hydraulic components of the Comprehensive Permit Application Package submitted by SLV River Street, LLC (Applicant). The materials were prepared in order to obtain Zoning Board of Appeals approval to conduct work on three adjacent parcels, located at 19-35 River Street in Winchester, Massachusetts (the Site). VHB's review evaluated the project's compliance with the Massachusetts Wetlands Protection Act (WPA) and its implementing regulations, National Flood Insurance Program (NFIP) regulations, the Winchester Subdivision Regulations for stormwater management requirements only, the Winchester Wetlands Bylaw (the Bylaw), and standard industry practice.

Specific documents were provided to VHB for review and comment and include the following:

1. Drainage Report dated June 11, 2018 prepared by Allen & Major Associates, Inc.,
2. Comprehensive Permit Application Plans for the Project dated June 11, 2018 prepared by Allen & Major Associates, Inc., consisting of 28 plan sheets, and
3. Hydraulic Analysis Flood Study – Aberjona River, dated March 26, 2019, prepared by The H.L. Turner Group, Inc.

Site and Project Description

The majority of the site is located within the Limited Light Industrial District (LL). The Site currently consists of two industrial/warehouse buildings with associated parking lots and a loading dock. A portion of the Site is located in the 1% annual chance Floodplain (FEMA Zone AE) and regulatory Floodway associated with the Aberjona River. Surface water drainage within the site and vicinity is tributary to the Aberjona River. The Project proposes to demolish the two existing buildings and parking areas and construct a multi-story residential building and an associated at-grade parking area.

The Natural Resource Conservation Service (NRCS) soil survey mapping identifies native soils at the site as Merrimac-Urban land complex, Udorthents-Urban Land Complex, and Urban Land (Web Soil Survey, 2018). NRCS identifies these materials as being formed within excavated and filled land (Urban Land series).

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Findings

Drainage Report

VHB has reviewed the Drainage Report, dated June 11, 2019. VHB identified several key components of the document that should be updated or enhanced:

1. Per Section 6.5.1 of the Subdivision Regulations, the Applicant should provide a description of impact to the 100-year floodplain and regulatory floodway and summary of compensatory storage calculations in the narrative. Supporting compensatory storage calculations should be provided and the description of the floodplain in the Drainage Report should be revised to match the design.
2. Per Sections 7.15.8, 7.15.9, and 7.15.15 of the Subdivision Regulations, the Applicant should provide a closed drainage analysis for the Site to confirm the design can accommodate the 25-year storm event. Analysis should confirm that proposed and existing pipes can accommodate outflows from the detention/infiltration systems as designed. In addition, the analysis should incorporate a tailwater condition to confirm no negative impacts. As the entire site eventually discharges to a 12-inch RCP municipal drain in River Street, the analysis must demonstrate that the 12-inch pipe can accommodate the flows from the site.
3. The Applicant refers to the redevelopment of the site in several instances throughout the Drainage Report. The Drainage Report should remove these references, as it appears to contradict the WPA definition of "redevelopment" and the statement under Standard 7 that the Project is not a redevelopment project.
4. In the Soils section, the Applicant states that NRCS lists the on-site soils (Map Unit 602 - Urban Land, Map Unit 626B Merrimac-Urban Land Complex, and Map Unit 656 Udorthents-Urban Land Complex), as Hydrologic Soil Group (HSG) A. Based on the test pit information provided in Appendix, VHB takes no exception to the Applicant's use of a HSG A designation for the on-site soils.
5. The Applicant complies with the Winchester stormwater runoff peak rate and volume control requirements and the precipitation data requirements per Sections 7.15.4 and 7.15.6 of the Subdivision Regulations, respectively.
6. Test pits indicated on Sheet C-106 and in Section 6.6 of the Drainage Report list Test Pits 1A, 1B, 2A, 3A, 3C, 3D, 4B, and 5. The test pit numbering implies that additional test pits performed as part of the soil exploration program (e.g. 2B, 3B, 4A, etc.), but that this information was not included in the documentation. If additional soil exploration was performed, the information should be included.
7. In the narrative for Standard 4, the Applicant indicates that 44% TSS removal is required. The Applicant should revise the narrative to indicate that 80% TSS removal is required.

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8. The Stormwater Checklist indicates that a NPDES Multi-Sector General Permit covers the land use and that a Stormwater Pollution Prevention Plan (SWPPP) will be submitted prior to discharge. If this is the case, the Applicant should provide additional information in the narrative on why a NPDES Multi-Sector General Permit would apply, and if so, should demonstrate that the design complies with requirements for land uses with higher potential pollutant loads.
9. Due to the presence of existing buildings, the Applicant was unable to perform test pits within the proposed footprints for Underground Infiltration Systems #2 (UIS-2) and #5 (UIS-5). VHB recommends that the Board include a requirement for the Applicant to perform, and submit results for review, confirmatory test pits within the footprints of these systems prior to construction to confirm that actual soil texture and seasonal high groundwater is consistent with that used in the design.
10. Existing HydroCAD Model:
 - a. The existing conditions are modeled with the site discharging to an existing drain manhole in River Street before the Design Point (SP-1, DMH in River Street). VHB suggests modeling the existing drain manhole as the design point and removing the "Ex. DMH" pond. The drain manhole outlets constrict the flow and does not accurately depict the rates and volumes of runoff discharging from the site for comparison of pre- and post-development rates. The drain manhole is also modeled with the connecting catch basins from River Street to show when the system surcharges out of the grates.
11. Proposed HydroCAD Model:
 - a. As indicated in Comment 9.a., VHB suggests modeling the existing drain manhole as the design point. Regardless of how the system functions under existing conditions, the proposed system design should demonstrate that flows from the site do not overwhelm the existing system in River Street.
 - b. The proposed green roof is modeled with a curve number (CN) of 86, which is consistent with guidance from Vol. 2, Ch. 2 p. 114 of the Massachusetts Stormwater Handbook.
 - c. The peak elevation of the water within the systems is above the top of the stone. The design should be revised to ensure that the water elevation during the 100-year storm does not exceed the top of stone to eliminate potential heaving of subgrade material and buckling of pavement.
 - d. Weir plates at outlets from underground systems should be modeled as sharp-crested weir. Broad-crested weirs should be reserved for spillways and overland flow.
 - e. The HydroCAD report states "Exfiltration rate of 4.0 in/hr is less than half of typical Rawls rate for sand (8.27 in/hr) for conservative purposes due to clogging of underlying materials." While VHB takes no exception to this approach for Underground Infiltration Systems #1 (UIS-1) and #2 (UIS-2), the Applicant should use 2.41 inches per hour (from Vol. 3, Ch. 1, Table 2.3.3 of the Massachusetts Stormwater Handbook) for Underground Infiltration System #5 (UIS-5), as TP-5 indicates that the soil in this area is loamy sand.

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- f. The underground infiltration/detention systems are modeled with outlet control structures/weirs as integral to the systems. This modeling configuration disregards any potential hydraulic restriction caused by the pipe between the infiltration/detention systems and the outlet control structures/weirs (i.e. more flow is shown leaving the system than can be conveyed by the pipe). A hydraulic restriction could invalidate the reported ponding elevations and peak rates. The Applicant should revise the HydroCAD model to account for the length of pipe between system and OCS and model the OCS as a separate outlet structure.
12. Required Recharge Volume calculations in Section 6.4 of the Drainage Report use a recharge factor for HSG B ($F=0.35$) for the green roof. Per Vol. 2, Ch. 2 of the Massachusetts Stormwater Handbook, precipitation captured by green roofs (through interception, storage, plant uptake, evapotranspiration) is not recharged to groundwater. As a result, the green roofs should be considered impervious area covering HSG A soils ($F=0.6$) for the purpose of calculating required recharge volume.
13. Per Vol. 3, Ch. 1 of the Massachusetts Stormwater Handbook, in no case shall runoff from less than 65% of the site's impervious cover be directed to infiltration BMPs. It appears that the proposed design directs only 48% of impervious areas to infiltration BMPs. The Applicant shall revise design to meet this requirement.
14. There is a discrepancy between the MA DEP water quality structure flow rate calculations and the Stormceptor Sizing Report provided by Contech Engineered Solutions in Section 6 of the Drainage Report. The MA DEP sizing calculations indicate a maximum contributing area of 0.25 acres, while the Stormceptor sizing report indicates 0.75 acres. In addition, the Stormceptor Sizing Report does not utilize the water quality flow rate calculated in the water quality structure flow rate calculations. The Applicant should revise the calculations to eliminate discrepancies.

Site Plans

15. The Applicant should revise the design to ensure that inflow from all inlet structures into underground systems is directed to isolator rows to ensure treatment. Pipes to isolator rows should either be set lower than or disconnected from the outlet header pipe. Roof Drains do not need to be directed to isolator row as roof runoff is considered "clean" per the Massachusetts Stormwater Handbook.
16. The proposed 12" HDPE pipe connecting OCS-5 to DMH-1A appears to fall one foot off of the building. As a result, this pipe would be subject to plumbing code requirements and, depending on the type of foundation proposed, could be subject to the bearing pressure of the building foundation. The Applicant should consider revising the layout to prevent potential undermining and negative impact on the integrity of the building foundation.

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17. The Applicant should consider looking at the pipe connections of the underground stormwater systems in series and the potential for stormwater to travel in the pipe bedding material. The Applicant may want to consider adding anti-seep collars
18. Sheet C-103 indicates a proposed 2:1 slope at the west of the building. Based on a callouts on Sheets C-101 and C-102, it appears that is a proposed lawn area. As 2:1 slopes are generally not considered mowable, the Applicant should either revise the grading or proposed surface accordingly.
19. While Sheet C-102 indicates that proposed light fixtures along the perimeter of the site are wall-mounted, symbols and locations indicate that the fixtures are pole-mounted. If pole-mounted, several light fixtures appear to be in conflict with pipes and underground systems based on the information shown on Sheet C-103. The Applicant should revise to eliminate the discrepancy and any conflicts.

Hydraulic Flood Study

20. Per the NFIP regulations 44 CFR 60.3(d)(3) development within the adopted regulatory floodway is prohibited unless it has been demonstrated through hydrologic and hydraulic analyses in accordance with standard engineering practice that the proposed encroachment would not result in any increase in flood levels within the community. Standard engineering practice for proposed regulatory floodway encroachments (i.e. no-rise analysis) is to follow a process similar to the Letter of Map Revision (LOMR) MT-2 instructions, and should utilize the same model used to prepare the effective Flood Insurance Study (FIS) report and Flood Insurance Rate Map (FIRM). The applicant should revise their hydraulic analysis accordingly.
21. Electronic files of the HEC-RAS model including all plans and geometries for the duplicate effective, corrected effective, and proposed conditions analysis should be provided.
22. Cross sections should extend far enough to contain all flood profiles modeled.
23. The effective and proposed condition hydraulic models should contain the same cross section locations. Currently, four cross section are in the proposed model only.

Rules and Regulations Governing the Subdivision of Land in the Town of Winchester, Massachusetts (Stormwater Management Requirements)

24. Per Section 7.15.10 of the Subdivision Regulations, a groundwater mounding analysis may be required. The design provides a minimum of 4-feet of groundwater separation for the proposed infiltration systems. A mounding analysis is not required at this time.

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25. Section 7.19.1 of the Subdivision Regulations includes several Sediment & Erosion Control requirements, including requirements for soil stockpiles, vehicle tracking pads, seeding restrictions, etc. that the Applicant should incorporate into Sheet C-1 and under Standard 8 in the Drainage Report.

Summary

As requested by the Town of Winchester, VHB reviewed the Comprehensive Permit Application package. VHB trusts the information provided above satisfactorily fulfills and addresses the Town's request for peer review of the stormwater, drainage, and hydraulic portions of the design. Please direct any questions or comments to Luke Boucher.



References

- Web Soil Survey. 2019. U.S. Department of Agriculture – Natural Resources Conservation Service.
<http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>
- U.S. Environmental Protection Agency (EPA). 2019. National Pollutant Discharge Elimination System General Permit for Discharges from Construction Activities
- Massachusetts Department of Environmental Protection (Mass DEP). 2008. Massachusetts Stormwater Handbook
- Town of Winchester, MA. Winchester Wetlands Bylaw (Chapter 13 of Winchester Code of Bylaws).
<https://www.winchester.us/DocumentCenter/View/107/Winchester-Wetlands-Bylaw-PDF>
- Winchester Conservation Commission. 2007. Policies on the 25' Buffer to Wetlands And Waterways.
<https://www.winchester.us/DocumentCenter/View/100/25-Foot-Setback-Policy-and-Tree-Replacement-Policy-PDF>
- Winchester Conservation Commission. 2011. Winchester Checklist of Items for Notice of Intent Filings.
<https://www.winchester.us/DocumentCenter/View/102/Winchester-Notice-of-Intent-Filings-PDF>
- Winchester Planning Board. 2012. Rules and Regulations Governing the Subdivision of Land in the Town of Winchester, Massachusetts. <https://www.winchester.us/DocumentCenter/View/971/Town-of-Winchester-Subdivision-Control-Law>
- Section 60.3 of the National Flood Insurance Program Regulations
https://www.fema.gov/media-library-data/20130726-1622-20490-7844/section60_3.pdf