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January 31, 2022

Ms. Jacki Byerley, Planner
Andover Planning Board
Town Office
36 Bartlett Street
Andover, MA 01810

Re: Initial Stormwater Peer Review
Andover West Elementary and Shawsheen Preschool
58 Beacon Street
Andover, MA

Dear Ms. Byerley and Board Members:

The Horsley Witten Group, Inc. (HW) is pleased to provide the Andover Planning Board with this letter report summarizing our initial peer review of the stormwater management for the proposed Andover West Elementary and Shawsheen Preschool at 58 Beacon Street in Andover, Massachusetts.

The plans were prepared for the Town of Andover (Applicant) by Symmes, Maini, & McKee Associates (SMMA). The Applicant is proposing to construction a new 191,000 square foot (sf) school building, outdoor learning areas, walkways, playfields, parking spaces, and underground utilities. The site is currently developed with the existing West Elementary School, playfields, and parking areas. The proposed stormwater management includes a closed drainage network, porous pavement, water quality units, bioretention areas, and lined subsurface detention systems.

HW has reviewed the stormwater management design for compliance with Andover's Stormwater Management and Erosion Control Bylaw and Regulations and the MassDEP Stormwater Standards. The proposed work is within the buffer zone of a wetland resource area and therefore the project will be under the jurisdiction of the Andover Conservation Commission and requires receipt of an Order of Conditions.

HW received the following documents and plans:

- Permitting Application for Andover West Elementary and Shawsheen Preschool at 58 Beacon Street in Andover, Massachusetts, prepared by SMMA, dated December 7, 2021, (82 pages) which includes:
    - Application Forms
    - Stormwater Management Report
- NOI PowerPoint Presentation, Prepared by SMMA, dated December 21, 2021.
- Permitting Application Appendices for Andover West Elementary and Shawsheen Preschool at 58 Beacon Street in Andover, Massachusetts, prepared by SMMA, dated December 7, 2021, (649 pages) which includes the following Appendices:
    A. Soil Report and Logs

B. Traffic Assessment Report (prepared by Brennan Consulting)
C. Stormwater Calculations
D. Construction Management Plan (prepared by Gilbane Building Company)
E. Operation and Maintenance Plan
F. Phase II Environmental Site Assessment
G. Illicit Discharge Compliance Statement
H. Stormwater Pollution Prevention Plan
I. Order of Resource Area Delineation

- Town Permit Submission plan set for Andover West Elementary and Shawsheen Preschool, 58 Beacon St, Andover, Massachusetts, prepared by SMMA, dated December 7, 2021, which includes:

o Existing Conditions Plan (Prepared by Nitsch Engineering)	EX-100
o Existing Conditions Plan (Prepared by Nitsch Engineering)	EX-101
o Existing Conditions Plan (Prepared by Nitsch Engineering)	EX-102
o Site Preparation Plan I - Phase 1	C-111
o Site Preparation Plan II - Phase 1	C-112
o Site Preparation Plan I - Phase 2A	C-113
o Site Preparation Plan II - Phase 2A	C-114
o Site Preparation Plan I - Phase 2B	C-115
o Site Preparation Plan II - Phase 2B	C-116
o Layout & Materials Plan I	L-121
o Layout & Materials Plan II	L-122
o Signage Plan	C-131
o Grading and Drainage Plan I	C-141
o Grading and Drainage Plan II	C-142
o Utilities Plan I	C-151
o Utilities Plan II	C-152
o Drainage Profiles I	C-301
o Drainage Profiles II	C-302
o Drainage Profiles III	C-303
o Sewer Profiles I	C-304
o Sewer Profiles II	C-305
o Planting Plan I	L-151
o Planting Plan II	L-152
o Details I	C-501
o Details II	C-502
o Details III	C-503
o Details IV	C-504
o Details V	C-505
o Details I	L-501
o Details II	L-502
o Details III	L-503
o Details IV	L-504

o	Details V	L-505
o	Details VI	L-506
o	Details VII	L-507
o	Level 1 – Overall	A-101
o	Level 2 - Overall	A-102
o	Level 3 - Overall	A-103
o	Roof Plan - Overall	A-104
o	Exterior Elevations - Overall	A-201
o	Exterior Elevations - Part A	A-202
o	Exterior Elevations - Part B	A-203
o	Exterior Elevations - Part C	A-204
o	Exterior Elevations - Part D	A-205
o	Exterior Elevations - Roof Garden	A-206
o	Site Photometrics Plan	EP-100

Stormwater Review

HW has reviewed the documents listed above and has the following comments concerning the stormwater management design in accordance with the Massachusetts Stormwater Handbook (MSH) dated February 2008, and the Town of Andover Stormwater Management and Erosion Control Bylaw and Regulations amended May 11, 2021 (Stormwater Bylaw).

In accordance with Section VI. B. of the Andover Stormwater Bylaw the Stormwater Management Permit and Narrative provided by an Applicant shall contain sufficient information to verify compliance with the local Stormwater Bylaw and the MassDEP Stormwater Management Handbook (MSH). Below are comments relating to the standards as presented in the MSH. Where the more stringent requirements of the Andover Stormwater Regulations are applicable those comments are included.

The proposed site improvements are considered redevelopment and therefore are required to comply with MassDEP Stormwater Management Standards 2, 3, and 4 only to the maximum extent practicable and the pretreatment requirements of Standards 4, 5, and 6 only to the maximum extent practicable. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

1. *Standard 1 states that no new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.*

    a. The existing site discharges stormwater via overland flow to four separate design points of analysis (DP):

        a. DP-1: A piped connection to the drainage main located beneath Beacon Street on the north side of the site.

        b. DP-2: An existing catch basin along the southerly side of Beacon Street located at the southeast corner of the site.

        c. DP-3: A wetland resource area located in the southeast portion of the site.

        d. DP-4: A small, wooded area near the northern portion of the site that receives a

small amount of overland runoff.

Under proposed conditions the Applicant has provided stormwater practices to collect, manage, treat, and recharge the stormwater within the developed areas of the site. The watershed areas and flow rates that continue to discharge towards the DPs have been reduced under proposed conditions. The project discharges stormwater runoff to adjacent bordering wetlands from proposed outfalls. The Applicant has demonstrated that there are no new untreated discharges to the wetlands as a result of the project.

b. The proposed development has several outfalls to wetland areas onsite. Some of these wetland areas are intermittent design points of analysis. Riprap has been proposed at each outlet, but it does not appear that riprap sizing calculations have been provided based on the outlets. For example, it is unclear the sizing of FES 1-1, FES 1-4, and FES 1-5. HW recommends that the Applicant provide riprap sizing calculations and include either a schedule of dimensions for each outfall on the flared end section detail in the plans set or dimension each on the Grading and Drainage Plan.

2. *Standard 2 requires that post-development runoff does not exceed pre-development runoff off-site.*

a. The Applicant has provided a HydroCAD model using the most recent Atlas-14 Rainfall data from NOAA's online database as noted in its stormwater report. HW recommends that the Applicant provide a printout of the rainfall data to include as part of the report to confirm the precipitation depths used.

b. The Applicant has mentioned the construction of a turf field on the project site. It is unclear how or if the subsurface area of the turf field will be connected to the proposed drainage system or if it will have any underdrains. The proposed grading on the proposed turf field is unclear. HW recommends that the Applicant include the proposed turf field design infrastructure as part of the Grading and Drainage Plan.

c. The Applicant has proposed a turf field but has not included any details of the subsurface system. HW recommends that the Applicant include any pertinent details for the turf field on the Detail Sheets of the plan set.

d. The Grading and Drainage Plans list inverts for drain manholes and catch basins either to the nearest tenth or nearest hundredth. Some drainage structures list all inverts and outlets and some list only one. HW recommends that the Applicant verify it has included all inverts and outlets of each structure. Furthermore, HW suggests that the Applicant consider adding a structure table to the Grading and Drainage Plan.

e. The Grading and Drainage Plans lists area drains surrounding the proposed school area. Some of these area drains do not have rim or invert elevations or callouts identifying them. HW recommends that the Applicant review the Grading and Drainage Plans and revise as needed.

f. The Grading and Drainage Plans lists length, size, and direction of flow on some pipes on the plan set but not all. HW recommends that the Applicant verify that all of the pipe sizes and slopes have been labeled on the plan set.

g. The pipe connecting FES 1-3 and FES 1-2 does not appear to have adequate cover based on the contouring in the area. Furthermore, an adjacent spot grade of 160.25 is shown by a sidewalk crossing with no corresponding 160 contour before the grade slopes to 159 into the adjacent Bioretention Area 1. HW recommends that the Applicant review the grading in this

area.

h. The pipe connecting OCS 1-1 and FES 1-1 lists the slope as .006 or 0.6%. Based on the outlet invert of OCS 1-1 and FES invert out this appears incorrect as there is a 5.74 foot drop over 200 feet (0.029 or 2.9%). Furthermore, the 24-inch outlet pipe appears to have an outlet invert elevation of 151.00. The surrounding grading indicates that this outfall is between contour elevations 154 and 153. It is unclear if there is any additional grading around the outfall. HW recommends that the Applicant review and revise this outfall as needed.

i. The grading around OCS 1-1 appears to be missing a 167 contour. The rim elevation is 167.5 with the nearest contour being 166. HW recommends that the Applicant review the grading in this area.

j. The Applicant has proposed three subsurface systems that are fully wrapped in impermeable liner. These subsurface systems have been wrapped due to high groundwater and are being used for detention and water quality. It appears none of these systems have underdrains in them and would therefore constantly hold water below the inlet and outlet elevations. For Example, Subsurface System 3 has an inlet of 156.00 and an outlet of 156.74. The bottom of the system is set at 156.00 and the bottom of the chambers is set at 156.75. System 3 is designed to have water sit to an elevation of 156.75 (outlet pipe) which means the inlet pipe at 156.00 would constantly stay submerged. HW recommends reviewing and revising these inlets and outlets as needed. HW also recommends installing a four-inch underdrain to ensure that the full storage can be drained and used. Furthermore, HW recommends that the Applicant review each outlet control structure (OCS) that has a two-inch orifice at the base of the outlet control weir to ensure proper drainage.

k. The Applicant has proposed three OCS for the three subsurface systems. Currently, the detail on the plan set calls out a two-inch orifice at the base of each weir that should be unplugged after every storm event to be operated as a manual drain. This appears to be labor intensive and is not listed in the O&M plan as something that is required after every storm event. HW recommends removing the plug from the orifice weir design and revising the HydroCAD to reflect an open low flow orifice. Furthermore, HW suggests reviewing the size of the orifice and revising to a larger size if flows allow to prevent clogging.

l. HW recommends adding the limit of disturbance to the Grading and Drainage Plans, the Utilities Plans, and the Layout and Materials Plans for reference.

m. The Applicant has provided a permeable pavement detail with a six-inch underdrain in an eight-inch reservoir stone layer. It is unclear based on the detail where the underdrain sits in the layer. HW recommends adding a dimension or elevation for reference.

n. The Applicant has proposed replacing a twelve-inch reinforced concrete pipe (RCP) wetland outfall pipe that connects to DMH 1-6. It is unclear if this is a back pitched pipe on purpose or if the inverts of DMH 1-6 are incorrect. HW recommends that the Applicant review and revise as needed or clarify the intent.

o. There are a few areas onsite where it appears the drainage pipe linework has multiple pipes shown on the Grading and Drainage Plans. HW recommends that the Applicant review the drainage linework and revise as needed.

p. The Applicant shows a detail for OCS 2-1. It appears that the invert in and the invert out are not consistent with the inverts called out on the Grading and Drainage Plan. HW recommends that the Applicant review and revise as needed.

q. The Applicant has provided a HydroCAD analysis to demonstrate that post-development runoff rates and volumes do not exceed those of pre-development conditions. HW has the following comments regarding the HydroCAD analysis:

   i. The Applicant is showing a 25-foot length of 12-inch pipe from DMH 1-29. The proposed HydroCAD models the proposed turf field with a 15-inch pipe having a primary outfall at 146.77. (Node - Pond P-1.3) HW recommends that the Applicant clarify the intent of this pipe and whether it is the outfall for the turf field. If so, HW recommends that the Applicant review and revise the size, slope, and elevation of the turf field outfall so that it is consistent with the Grading and Drainage Plans.

   ii. The Applicant shows two large areas of porous pavement on the plans. These areas are depicted in the proposed HydroCAD as Ponds P-1.11 and P-2.1. Both of these nodes have primary outlets included as 12-inch culverts. However, the detail for porous pavement and the routing on the plans depict a 6-inch pipe. HW recommends that the Applicant revise the plans or HydroCAD for consistency. Furthermore, HW recommends coordinating the outlet invert height for the primary outlet in HydroCAD with the detail on the plans. (In reference to comment 2.m).

   iii. The Applicant has proposed three bioretention areas onsite for water quality and storage. These areas are depicted in the proposed HydroCAD as Ponds B-1.10, B-1.6, and B-3.0. The detail on the plans shows each of these bioretention areas are lined with an impermeable liner and have an underdrain. However, these underdrains area not modeled as part of the HydroCAD. HW recommends revising the HydroCAD to include the modeling of these underdrains as outlet flow from the bioretention areas to present a more accurate representation of capacity.

   iv. The Applicant has provided peak flow attenuation and analysis for the entire site. This analysis shows the existing condition of the site and the final post construction condition of the site. However, based on the phasing plan, it appears there is an intermittent time where the impervious runoff onsite is considerably more than the existing or the proposed condition and the proposed drainage system will not be installed to detain or provide water quality. HW recommends that the Applicant provide an analysis of the interim condition and confirm that the increased runoff does not create an adverse interim condition that the downstream design points cannot manage.

r. It appears there is a foundation drain called out around the building, but it does not have a symbol on the plan set. HW recommends including this line type symbol in the legend.

3. Standard 3 requires that the annual recharge from post-development shall approximate annual recharge from pre-development conditions.

a. The Applicant has conducted multiple test pits onsite. A geotechnical report that includes soil borings has been provided as part of the Stormwater Report by Nobis Engineering. Based on the geotechnical report and test pit data, the depth to groundwater onsite ranges from zero feet (at surface) to greater than 10 feet with several areas under 3 feet depth to groundwater. Due to the conditions onsite, it appears impracticable to recharge groundwater, so the Applicant has lined stormwater systems and focused on water quality and a reduction in impervious. The proposed site design has an overall reduction in impervious area. The required recharge volume is 0 cf. No further action required.

4. *Standard 4 requires that the stormwater system be designed to remove 80% Total Suspended Solids (TSS) and to treat 1.0-inch of volume from the impervious area for water quality.*

    a. The Applicant has stated that the project achieves at least 80% TSS removal via deep sump catch basins and a hydrodynamic separator located just before the stormwater system discharges into the wetland. HW has the following comments on this calculation:

        i. The Applicant has provided two details for water quality units (WQU). It is unclear based on the plans where each of these are used. HW recommends that the Applicant provides a schedule in the details that lists which WQU is to be used where or detail callout on the Grading and Drainage Plans.

        ii. The Applicant has provided water quality calculations for the water quality flow rate require of each WQU. However, it does not appear that the Applicant has provided manufacturer information confirming the credit listed for the TSS removal. HW recommends that the Applicant provide additional manufacturer information to confirm the TSS removal rate of the WQU.

        iii. The Applicant has provided TSS removal calculations. However, it does not appear that all treatment trains have been included. For example, there are no subsurface systems shown in any of the treatment trains provided. HW recommends that the Applicant review the stormwater management system to confirm that all treatment trains for TSS removal are provided. I

5. *Standard 5 is related to projects with a Land Use of Higher Potential Pollutant Loads (LUHPPL).*

    a. The Applicant has noted that the proposed project is not considered a LUHPPL. However, based on the additional trips calculated in the traffic impact assessment it appears this project would be considered a LUHPPL as it exceeds 1000 vehicle trips per day. The existing condition generates 418 and 207 trips in the AM and PM peak hours, respectively. Based on the extrapolation of additional students, an additional 315 AM peak hour and 156 PM peak hour trips will be made. Together, these trips exceed 1000 vehicle trips per day. Therefore, Standard 5 is applicable.

    The Applicant has provided 80% TSS removal onsite including 44% pretreatment based on the treatment trains provided and water quality separators.

    The Applicant appears to comply with Standard 5.

6. *Standard 6 is related to projects with stormwater discharging into a critical area, a Zone II, or an Interim Wellhead Protection Area of a public water supply.*

    a. The site does not discharge to a critical area, therefore Standard 6 is not applicable.

7. *Standard 7 is related to projects considered Redevelopment. A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.*

    a. The proposed project is considered a redevelopment, therefore Standard 7 is applicable. It is HW's opinion that once the Applicant adequately addresses the comments in this letter and raised by the Town, the proposed stormwater management design is improving existing

conditions and complies with the MSH to the maximum extent practicable.

8. *Standard 8 requires a plan to control construction related impacts including erosion, sedimentation, or other pollutant sources.*

   The Applicant has provided multiple Site Preparation Plans which include multiple phases. These plans include the Sediment and Erosion controls for each phase.

   a. The Applicant has proposed straw wattles and sediment sacks at catch basins throughout each phase. HW recommends that the Applicant include installation of sediment sacks or catch basin inserts in all the existing onsite and all of the proposed catch basins as they are constructed within the limit of work during the construction phase and within 100 feet of the construction entrance on both sides of the road.

   b. The Applicant has proposed the use of straw wattles as an erosion control measure. It appears that the straw wattles could be extended in certain areas to contain potential exposed disturbed soil. For example, on the northwest side of the existing building, the straw wattles can be extended to border the entire shaded area that is called out for pipe and pavement removal. HW recommends that the Applicant revisit the straw wattle line and adjust accordingly.

   c. Site Preparation Phase I calls for temporary pavement to be installed at the southeastern portion of the site. It appears that some riprap hatching has been included in this area. It is unclear its purpose and is not shown as an erosion control measure on the plans as it is not located in a position as a viable construction entrance area. HW recommends that the Applicant provide erosion control measures around these parking areas to limit any sediment runoff to the adjacent wetland.

   d. Phase I of Site Plan preparation calls for construction of the new school as well as grading, drainage, outfall stabilization, and pipe removal at the north and west portions of the site. It appears that some of the areas that call for riprap stabilization of new outfalls or pipe removal are either outside the limits of work or not included within the limits of erosion and sediment control based on the location of the straw wattles. HW recommends revising the plans to show erosion and sedimentation control at all areas within the wetland buffer onsite.

   e. There are several drainage structures proposed as part of the phase 1 portion of development around the proposed school. These drainage structures are upgradient of structures proposed to be built as part of the second phase of construction. HW recommends that the Applicant include a note stating that it is the responsibility of the contractor to maintain drainage onsite during all phases of construction. HW also recommends that the Applicant clarify how drainage will be managed and conveyed during the interim phase between phase 1 and phase 2. A separate plan may be useful to clearly illustrate this.

   f. The proposed development requires disturbance of greater than one acre of land and therefore is required to obtain coverage under the NPDES Construction General Permit issued by EPA and prepare a Stormwater Pollution Prevention Plan (SWPPP). The Applicant has provided a draft SWPPP. HW recommends that a copy of the final SWPPP be provided to the Town at least 14 days prior to commencing land disturbance activities.

9. *Standard 9 requires a Long-Term Operation and Maintenance (O&M) Plan be provided.*

   The Applicant has provided a Stormwater Operation and Maintenance (O&M) Plan, which includes instructions for maintenance of stormwater control measures, an O&M budget, and an O&M checklist. HW has the following comments regarding the O&M Plan:

a. Per MSH Volume 2, Chapter 2, HW recommends that the O&M Plan be revised to require catch basin inspection and maintenance four times per year.

b. Per Andover Stormwater Regulations Section VI.C.1.b.1, HW recommends that the Applicant include the name and address (contact information) of the persons responsible for the maintenance and emergency repairs.

c. Per Andover Stormwater Regulations Section VI.C.1.b.6, HW recommends including an estimated operation and maintenance budget.

d. Per Andover Stormwater Regulations Section VI.C.1.b.7, HW recommends that the Applicant include a simple sketch as part of the O&M Plan that clearly labels the various stormwater practices to be inspected.

10. Standard 10 requires an Illicit Discharge Compliance Statement to be provided.

a. The Applicant has stated that there are no known or suspected illicit discharges. The Applicant has provided a signed Illicit Discharge Compliance Statement. HW has no further comment.

The Applicant complies with Standard 10.

Additional Comments per Andover Stormwater Regulations:

11. Section IX (Andover Stormwater Regulations - Design Criteria)

a. C - Pretreatment: The Applicant must size all pretreatment practices (deep sump catch basins) to accommodate one-years' worth of sediment and debris using the calculation provided in Andover's regulations. HW recommends that the Applicant provide the required calculation.

b. D – Pollutant Removal: As a redevelopment project, the design is required to remove 80% of TSS and 50% of Total Phosphorus (TP). The Applicant has not provided phosphorus loading and removal calculations. HW recommends that the Applicant provide the required phosphorus removal calculations.

12. Other Comments:

a. Pipe calculations – The Applicant has provided the pipe sizing calculations for a 25-year storm event. It appears based on the plans that there are some elevation discrepancies listed based on inverts on the plans and inverts in the table. This could be due to the inconsistency of significant digits used for invert elevations. Some of these inconsistencies include but are not limited to:

1. DMH 1-12 (rim)
2. DMH 1-6 (rim)
3. DMH 1-15 (rim or inverts)
4. DMH 2-11 (invert out)
5. OCS 2-1 (invert out)

HW recommends that the Applicant review the pipes on the plans and the table to confirm consistency with rims and inverts.

b. HW recommends that the Applicant address any additional comments provided by the Planning Board or Department of Public works in relation to the stormwater or wetland review of this project.

c. There are multiple areas onsite where the Applicant is working within the 25-foot wetland buffer area. Per the Town of Andover's Wetland's Protection By-Law, a 25-foot undisturbed vegetated buffer shall be maintained. This is further described in Section 4.2 of the Conservation Commissions Wetland Protection Regulations. HW defers to the Conservation Commission for approval for working within this area.

Conclusions

HW recommends that the Planning Board require the Applicant to provide a written response to address these comments as part of the permitting review process. The Applicant is advised that provision of these comments does not relieve him/her of the responsibility to comply with all Town of Andover Codes and By-Laws, Commonwealth of Massachusetts laws, and federal regulations as applicable to this project. Please contact Janet Bernardo at 857-263-8193 or at jbernardo@horsleywitten.com if you have any questions regarding these comments.

Sincerely,

HORSLEY WITTEN GROUP, INC.

Janet Carter Bernardo, P.E.
Associate Principal

Steve Stanish, P.E.
Senior Engineer

CC: Andover Conservation Commission