Horsley Witten Group
Sustainable Environmental Solutions
112 Water Street • 6th Floor • Boston, MA 02109
857-263-8193 • horsleywitten.com

September 16, 2022

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

Re: Third Stormwater Peer Review
Sellers Farm Estates – Modified Definitive Subdivision
171 Rear Highland Road, Andover, MA
MassDEP File No. 090-1392

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 third peer review of the stormwater management for the proposed residential development located at 171 Rear Highland Road, Andover, Massachusetts. LRC Builders LLC (Applicant) have submitted an application for a 3-lot subdivision. The 3.46-acre parcel is currently undeveloped and includes a bordering vegetated wetland (BVW) in the center of the parcel that is approximately 6,900 sf. There is also a large BVW along the southern portion of the parcel. The two wetlands appear to be connected by an old stone culvert. The Applicant is proposing to construct a 382-foot-long roadway and three new houses. To capture, treat, and manage the stormwater runoff from the proposed roadway and houses the Applicant is proposing to install a closed drainage system and three surface infiltration basins. The proposed cul-de-sac, all three houses and all three driveways appear to be within the 100-foot buffer zone to one of the BVWs. A culvert is proposed under the driveway to Lot 2. The proposed development is within the jurisdiction of the Andover Conservation Commission.

The following additional documents and plans were received by HW in response to our initial May 2, 2022 peer review and second July 22, 2022 peer review:

- Letter to Jacki Byerley regarding Stormwater Peer review, prepared by Ranger Engineering Group, Inc., dated July 22, 2022 (10 pages);
- Stormwater Management Report, Sellers Farm Road, prepared by Ranger Engineering Group, Inc., prepared for LRC Builders, LLC, dated March 4, 2022, updated September 13, 2022 (297 pages); and
- Modified Definitive Subdivision Plan for Sellers Farm Estates, Andover, MA, prepared by Ranger Engineering Group, Inc., prepared for LRC Builders, LLC, dated February 25, 2022, revised through September 13, 2022 which includes:
    - Cover Sheet 1 of 14
    - Notes and Legend 2 of 14
    - Lot Plan 3 of 14
    - Existing Conditions Plan 4 of 14
    - Layout and Materials Plan 5 of 14

o	Grading and Drainage Plan	6 of 14
o	Utility Plan and Profile	7 of 14
o	Highland Road Profile	8 of 14
o	Site Details	9 of 14
o	Utility Details	10 of 14
o	Drainage & Water Details	11 of 14
o	Drainage Details	12 of 14
o	Erosion and Sediment Control Plan	13 of 14
o	Erosion & Sediment Control Notes & Details	14 of 14

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 following comments correlate with our July 22, 2022 second peer review letter, follow up comments are provided in underlined bold font.

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 proposed development has two design points.

      1) Design Point 1 (DP1) is Highland Road. Under existing conditions, the stormwater from a portion of the site between #167 and #171 Highland Road (EX1) flows north towards Highland Road. Under proposed conditions the drainage within the proposed roadway is collected in catch basins and piped south towards the BVW. A portion of the site (P2) which has been reduced under proposed conditions continues to flow towards Highland Road. HW concurs with the Applicant's assessment of DP1, no further action needed.

         July 22, 2022: HW has no further comment.

      2) DP2 is the A-series wetland located along the southern property boundary. Most of the parcel slopes towards the south. It appears that there may be additional offsite areas that also flow through the project site to the southern wetland. HW recommends that the Applicant review the boundaries of EX2 specifically along the northern property boundary and the western property boundary and justify the limits of the catchment area. The proposed catchment area may need to be adjusted to match the limits of the existing watershed.

July 22, 2022: The Applicant has added additional topography on Sheet 4 and 7 to demonstrate that a portion of land to the northeast of the property boundary and a small section from the east flow onto the project site. HW has no further comment.

3) HW further recommends that the Applicant delineate the catchment area that flows towards the central B-series wetland. HW recommends that the Applicant include a third design point to evaluate the stormwater flowing into the B-series wetland under existing and proposed conditions.

   July 22, 2022: The Applicant has delineated catchment area EX3 for the predevelopment watershed flowing towards the B-series wetlands and catchment area P6 for the post development watershed flowing towards the B-series wetland. However, the Applicant has routed EX3 through a deep channel (Reach 2R) that is labeled "Flow thru wetl series 'A' to back property." HW recommends that the Applicant illustrate on the Existing Conditions Plan where this channel is.

   September 16, 2022: The Applicant has revised the drainage areas to exclude the area within the "A" series wetland. The new design point is now the A series wetland line, and the model routing has been revised. HW recommends that the Applicant also revise the Tc line on the proposed watershed plan for P6 to reflect the revised HydroCAD model. HW has no further comment.

4) **July 22, 2022: Furthermore, in the HydroCAD model for predevelopment conditions the Applicant has included a 12-inch pipe (Reach 1R) labeled "Flow from wetl series 'B' to 'A'" which is modeled separately. This 12-inch pipe is not shown on the Existing Conditions Plan. The Notice of Intent narrative describes the connection between the B series wetland and the A series wetland "*through an old stone culvert under a wood's road*." HW recommends that the Applicant add the location of the stone culvert to the Existing Conditions Plan and revisit the HydroCAD model using the existing stone culvert as the reach or justify why the deep channel was modeled instead.**

   September 16, 2022: The Applicant has revised the Existing Conditions Plan to show a rubble filled hydraulic connection. This connection has been revised in the HydroCAD model. A 12" overflow pipe has been proposed to act as an emergency overflow and it has been shown in the model as a conveyance in the largest storm event.

b. The Applicant has proposed three infiltration basins. Two of the basins discharge to the A-series wetland with 12-inch reinforced concrete pipes (RCP). The Flared End Section detail is provided on Sheet 11 (CS6021). The detail indicates that the stone apron should be 36" wide by 36" long. HW recommends that the Applicant provide riprap apron sizing calculations to verify that the stormwater discharge will not cause erosion within the wetland.

   July 22, 2022: The Applicant has provided the requested calculations. HW has no further comment.

c. Infiltration Pond 2 is located on Lot 1. The basin exfiltrates and has an overflow weir located approximately 35 feet from the B-series wetland. HW recommends that the Applicant document that the discharge rate will not cause erosion in the central BVW.

July 22, 2022: The Applicant has confirmed that the discharge rate will be less than 2 fps and therefore will not cause erosion in the central BVW. HW has no further comment.

d. HW recommends that the Applicant confirm that the proposed culvert located under the driveway to Lot 2 will not cause erosion to the BVW. The layout shown on Sheet 6 (CS1501) appears to place the culvert within the wetlands causing an impact that will require approval from the Conservation Commission. Furthermore, the invert and outlet for the two 12-inch culverts are not consistent between the HydroCAD model and the plan view.

July 22, 2022: The Applicant has added riprap scour aprons on both ends of the culvert and appear to have placed the riprap and proposed culverts outside of the wetland boundaries as shown on Sheet 6 of 14 (CS1501). The profile provided on Sheet 9 of 14 (CS6001) indicates that there are two 12-inch HDPE pipes at elevation 260/259. The HydroCAD model for Reach 1R (Culvert Under Drive) indicates one 12-inch pipe at elevation 259/258. HW recommends that the Applicant adjust the proposed culvert to be consistent between the HydroCAD model and the site plans.

September 16, 2022: The Applicant has revised the outfall for Wetland Series 'B' to include a rubble filled hydraulic connection and a single 12-inch pipe at elevation 260. This has been modeled in HydroCAD and shown that the 12-inch pipe acts as an emergency overflow only. The Applicant has revised the plans to be consistent with the model. HW has no further comment.

e. July 22, 2022: The HydroCAD model provided indicates that the proposed stormwater peak flow and peak volume increase under post-development conditions to the small series B wetland system in the center of the property. HW recommends that the Applicant determine if the proposed layout will "alter" a wetland in accordance with the definition listed under 310 CMR 10.04. HW further recommends that the Applicant revisit the design and the HydroCAD model to avoid any alterations to the existing resource area.

24-hour storm event	Rainfall (inches)	Pre- peak flow (cfs)	Post-peak flow (cfs)	Pre-volume (CF)	Post-Volume (CF)
2-year	3.18	1.07	1.49	4,690	6,222
10-year	5.04	2.71	3.27	11,186	13,358
25-year	6.20	3.85	4.44	15,753	18,177
100-year	7.99	5.68	6.27	23,239	25,906

September 16, 2022: The Applicant has reviewed the design and provided additional calculations for its model. The Applicant demonstrates that while there is an increase in larger less frequent storms, the majority of storms do not have an adverse effect to the wetland series B. The majority of storms have been analyzed as the 95th percentile of storms for the Boston Area. The ponding during this analyzed storm event (the 1.5" storm) shows an increased flow of less than .1 cfs and an increased ponding of .03" during the storm event. HW finds the Applicant's explanation reasonable and concurs that the wetland series B will not be altered as a result of the proposed development.

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

   a. The Applicant has provided a HydroCAD model to verify that post-development conditions do not exceed pre-development conditions to DP1 (Highland Road) or DP2 (the BVW on the south side of the parcel). The pre-development HydroCAD model describes DP1 as pond SP2 (Sum Pond Street) and DP2 as pond SP1 (new Pond). The post-development HydroCAD model describes DP1 as pond SP2 (Sum Pond Street) and DP2 as pond SP1 (Sum Pond Woods). The labeling and descriptions are confusing and HW recommends that the Applicant consider clarifying the HydroCAD model.

   July 22, 2022: The Applicant has made a few adjustments to the naming convention in the HydroCAD model to minimize confusion. HW has no further comment.

   b. The Applicant has indicated gravel road and fallow soil in the Post Development HydroCAD. HW was not able to locate the gravel road or the fallow soil in the proposed plans. HW recommends that the Applicant verify where in the plans the gravel road and fallow soil are proposed.

   July 22, 2022: The Applicant has clarified the surface descriptions used. HW has no further comment.

   c. The Applicant has indicated a surface condition of "poor" for the Woods in the Post Development HydroCAD model. HW recommends that the Applicant justify the use of "poor" Woods. Furthermore, HW recommends that the Applicant confirm that the curve numbers used in the HydroCAD model are consistent with Table 1 in Section IX.E. of the Andover Stormwater Bylaw.

   July 22, 2022: HW recommends that the Applicant revisit the curve numbers used under Pre-development Conditions to confirm it has used the correct values listed in Table 1 in Section IX.E. of the Andover Stormwater Bylaw. For example, the Applicant has used poor grass with a CN of 86 and poor woods with a CN of 77. Table 1 requires that the Applicant use a value of 74 for the grass and a value of 70 for the woods under Pre-Construction. HW is in agreement with the CN values used by the Applicant under Post-Development.

   September 16, 2022: The Applicant has revised the area cover CN in the Pre-Development HydroCAD model. HW has no further comment.

d. HW recommends that the Applicant confirm it has calculated the times of concentration (Tc) for the existing (EX2) and the proposed (P6) catchment areas that flow through the B-series wetland accurately.

July 22, 2022: The Applicant has updated the calculations, HW finds the Tc value through the wetland to be reasonable. However, it appears that the Applicant has used various minimum Tc values under pre-development and post-development conditions. HW recommends that the Applicant use 5 minutes or 6 minutes consistently.

September 16, 2022: The Applicant has updated the Pre-Development and Post-Development HydroCAD models to use a minimum Tc of 6 minutes for all nodes. HW has no further comments.

e. Infiltration Pond 3 is located on Lot 2. The HydroCAD model indicates that the 12-inch primary outlet is set at elevation 263.00, the detail on Sheet 12 (CS602s) notes that the 12-inch invert is at 262.00. The detail further indicates that the 12-inch outlet is set at 259.00. The plan view on Sheet 6 (CS1501) calls out the flared end section (FES 2) at 261.50. HW recommends that the Applicant confirm that the plan view, detail, and HydroCAD model are consistent.

July 22, 2022: The Applicant has updated the plan view, detail and HydroCAD model. HW recommends that the Applicant develop a means to avoid clogging of the lower orifices in Outlet Control Structure (OCS) 2.

September 16, 2022: The Applicant has added a debris grate that has been specified in the OCS details on Sheet CS6022. HW has no further comment.

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

a. In Section X. of the Stormwater Management Report, the Applicant has listed the recharge volumes provided by each of the infiltration basins. HW recommends that the Applicant provide the HydroCAD stage storage print out for each basin to confirm the volume provided below the outlets.

July 22, 2022: The Applicant has noted in Section X of the Stormwater Management Report that the available storage for Basin 1 is 1,822 cubic feet (cf). The Stage-Area-Storage for Pond 1 printout included indicates that the storage below elevation 260.64 (4" orifice) is 1,546 cf. HW recommends that the Applicant reconfigure Pond 1 to provide greater than 1,626 cf.

The Stage-Area-Storage for Pond 2 printout included indicates that the storage below elevation 263.05 (3" orifice) is 1299 cf. The available storage is greater than the required storage of 454 cf however the narrative lists 1100 cf and 1560 cf. HW recommends that the Applicant confirm the values listed in the narrative.

HW recommends that the Applicant review the drawdown calculations provided in Section X of the Stormwater Management Report. The various values used for storage provided and bottom area of the basins do not appear to be consistent with the HydroCAD model provided.

September 16, 2022: The Applicant has revised Section X to be consistent with the HydroCAD model and the Stormwater Management Report. HW has no further comment.

b. The two closest test pits for Basin 2 are TP4 and TP9. Neither test pit falls within the footprint of the basin. The estimated seasonal high groundwater (ESHGW) at TP 9 indicates groundwater at approximately elevation 263 which is higher than the bottom of the basin, the required 2 feet of separation has not been satisfied. HW recommends that the Applicant conduct additional soil testing to demonstrate adequate separation to the ESHGW per MSH Volume 2 Chapter 2 Page 88. HW further recommends that the Applicant verify if a mounding analysis is required and provide if applicable.

   July 22, 2022: Additional test pits are shown on Sheets 4 (CS0201) and 6 (CS1501) of the site plans. The Applicant has raised Pond 2 to maintain the required 2 feet of separation between the ESHGW and the pond bottom shown on Sheet 6 (CS1501) and Sheet 12 (CS6022) of the site plans. HW has no further comments.

c. Similarly, HW recommends that the Applicant conduct additional test pits within the footprint of Basin 3 to demonstrate adequate separation to the ESHGW per MSH Volume 2 Chapter 2 Page 88. HW further recommends that the Applicant verify if a mounding analysis is required and provide if applicable.

   July 22, 2022: The Applicant conducted additional test pits shown on Sheets 4 (CS0201) and 6 (CS1501) of the site plans. The Applicant has also raised Basin 3 to maintain the 2 feet of separation between the ESHGW and the pond bottom shown on Sheet 12 (CS6022) of the site plans. HW has no further comments.

d. It appears that Basin 1 has greater than 2 feet of separation to ESHGW but less than 4 feet. HW recommends that the Applicant provide a mounding analysis per the MSH Volume 3, Chapter 1, Page 28.

   July 22, 2022: The Applicant has provided the Mounding Analysis as requested. It is not clear if the Recharge value was calculated accurately. HW has provided an explanation of the Recharge Rate calculation for the mounding analysis below. We recommend that the Applicant confirm the value it has used in the analysis is accurate.

   R = Recharge Rate (feet/day): Recharge rate, also described as the Rate of Application, is calculated by dividing the volume (cf) designed to be infiltrated by the area (sf) of the basin bottom. If the basin has an overflow outlet, the infiltrated volume is the volume stored below the outlet of the basin. If the basin does not have an outlet the volume is what is conveyed to the infiltration facility from its contributing drainage area during the largest storm (potential 100-year) that is designed to be infiltrated. Divide that volume by 3 days as the MA Stormwater Standards require all facilities to empty within 72 hours. Recharge = volume/area/3 days = feet/day. Think of this as the column of water that must be infiltrated vertically per the system's design.

   September 16, 2022: The Applicant has revised the recharge calculations and provided drawdown times that are less than the 72 hour MA Stormwater Standard requirement. HW has no further comment.

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 chosen to size the infiltration basins to provide water quality treatment as well as recharge volume. HW recommends that the Applicant provide the HydroCAD stage storage print out for each basin to confirm the water quality volume provided below the outlets.

    July 22, 2022: HW has provided comments above regarding the storage in the basins.

    September 16, 2022: The Applicant has provided stage storage calculations for the infiltration basins. HW has no further comment.

    b. The Applicant has proposed catch basins, sediment forebays and infiltration basins to provide adequate TSS removal. No further action required.

    July 22, 2022: HW has no further comment.

    c. Basin 2 appears to capture runoff from a driveway curb scupper which leads to the forebay (Sheet 12 of 14). HW recommends that the Applicant confirm that the curb scupper is properly sized and that flow will not cause erosion between the driveway and the basin.

    July 22, 2022: The Applicant has added a detail for the curb scupper on Sheet 11 of 14. An additional riprap spillway has also been added to prevent erosion. HW has no further comment.

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

    a. The site is not considered a LUHPPL, therefore Standard 5 is not applicable.

    July 22, 2022: HW has no further comment.

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 is not within a critical area, therefore Standard 6 is not applicable.

    July 22, 2022: HW has no further comment.

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 new development. Therefore, Standard 7 does not apply.

    July 22, 2022: HW has no further comment.

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

a. The Applicant has included an Erosion and Sediment Control Plan, Sheet 13 (CS8001). The legend lists check dams. HW recommends that the Applicant include a check dam detail.

July 22, 2022: The Applicant has added a check dam detail to Sheet 14 (CS8501). HW has no further comment.

b. HW recommends that the Applicant include proposed stockpile locations with appropriate erosion controls on the Erosion & Sediment Control Plan.

July 22, 2022: The Applicant has added a stockpile location to Sheet 13 (CS8001) and erosion control details to Sheet 14 (CS8501) of the plan set. HW has no further comment.

c. HW recommends that the Applicant add fencing around the infiltration basins to prevent heavy vehicles from compacting the soil.

July 22, 2022: The Applicant added fencing around the basins and added the snow fencing detail to Sheet 14 (CS8501). HW has no further comment.

d. The Applicant provided a Fiber Log Detail on Sheet 14 (CS8501). HW recommends that the Applicant show where this practice is being used and clarify that the practice shall not use straw or hay.

July 22, 2022: The Applicant has specified the location on Sheet 13 (CS8001) and clarified in the detail on Sheet 14 (CS8501) that hay or straw will not be used. HW has no further comment.

e. HW recommends that the Applicant clarify the number of large trees (greater than 12" diameter) that will be removed as part of the proposed layout. Per Section IX.H.14. of the Andover Stormwater Regulations, tree removal shall be minimized.

July 22, 2022: The large trees anticipated to be removed have been marked on Sheet 5 (CS1001). The Applicant has noted that a row of conifers will be removed to construct the roadway, as well as 10 large trees for the roadway and drainage construction. Lot 1 requires 6 large trees to be removed, Lot 2 requires 20 large trees, plus 5 dead or dying Ash trees for the driveway, and Lot 3 requires 10 large trees to be removed.

September 16, 2022: The Applicant has included these removals on Sheet 5. HW has no further comment.

f. HW further recommends that the Applicant verify it has reviewed and complies with Section IX.H. of the Andover Stormwater Regulations.

July 22, 2022: The Applicant has added the requirements from Section IX.H to the notes on Sheet 14 (CS8501) and acknowledges them. HW has no further comment.

g. The proposed project requires land disturbance of greater than 1 acre. Therefore, a Stormwater Pollution Prevention Plan (SWPPP) per the EPA NPDES Construction General Permit will be required. HW recommends that the Applicant provide a copy of

the SWPPP to the Town a minimum of 14 days prior to land disturbance.

July 22, 2022: The Applicant agrees to provide a SWPPP at least 14 days prior to land disturbance. The Planning Board or the Conservation Commission may choose to require receipt of the SWPPP as a condition of approval.

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

a. The Applicant has provided a Long-Term Pollution Prevention Plan in the Stormwater Management Report as required. HW recommends that the document become a standalone document to be signed by the property owners prior to occupancy.

July 22, 2022: HW recommends that the Long-Term Pollution Prevention Plan become a standalone document signed by the responsible party. If the Town will be accepting the roadway the DPW should review the O&M Plan. If the individual property owners will be maintaining the stormwater basins on their properties separate O&M Plans for each property should be prepared. If a Homeowners Association is intended to maintain all practices, direction should be clearly outlined in the Homeowners Associate documents. The Planning Board or Conservation Commission may choose to require receipt of the appropriate documents prior to occupancy.

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

a. HW recommends that a signed Illicit Discharge Compliance Statement be provided to the Conservation Commission prior to the discharge of any stormwater to post-construction best management practices (BMPs).

July 22, 2022: The Planning Board or Conservation Commission may choose to require receipt of a signed Illicit Discharge Compliance Statement prior to land disturbance.

11. Additional comments per Andover Stormwater Bylaw.

a. Per Section IX. A. HW recommends that the Applicant document the low impact development practices that were considered for this project.

July 22, 2022: HW recommends that the Applicant document the low impact development practices that were considered for this project.

September 16, 2022: HW's comment stands. HW recommends that the Applicant include this discussion in the proposed condition section or stormwater design narrative section of its report.

b. Per Section IX.D.2. HW recommends that the Applicant verify if the project site discharges to a water body or tributary subject to a Total Maximum Daily Load (TMDL).

July 22, 2022: The Applicant confirmed that the site does not discharge into a water body or tributary subject to TMDL. HW has no further comment.

c. HW recommends that the Applicant clearly document the limit of work. It appears that the erosion control barrier is being placed on the property of #171 Highland Road. Furthermore, it appears that there are some trees and some proposed grading that is outside of the erosion control barrier. HW recommends that the Applicant revisit the

erosion controls and adjust as applicable.

July 22, 2022: The Applicant has adjusted the limit of work as requested. HW has no further comment.

Conclusions

HW is satisfied that the Applicant has adequately addressed our comments. 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