

REF.: MAX-2018131.00

August 2, 2019

Ms. Elizabeth Hughes
Town Planner
Concord Zoning Board of Appeals
141 Keyes Road
Concord, Massachusetts

SUBJECT: Stormwater Peer Review
Center and Main Planned Residential Development
1440 & 1450 Main Street, Concord, MA

Dear Ms. Hughes and Members of the Board:

Greenman-Pedersen, Inc. (GPI) is pleased to assist the Town of Concord (the Town) Zoning Board of Appeals (ZBA) with the peer review of the stormwater design associated with the Planned Residential Development (PRD) at 1440 & 1450 Main Street (the Project).

Initial Technical Peer Review (completed)

GPI prepared an initial technical peer review letter in September of 2018. The following documents, submitted by the Applicant in July of 2018, served as the basis for that Stormwater Design review:

- *Board of Appeals Application and Narrative (Special Permit, Variance, Planned Residential Development) for Center & Main A Planned Residential Development at 1440 & 1450 Main Street* as prepared by Stamski and McNary, Inc., dated July 12, 2018 (10 pages)
- *Center & Main A Planned Residential Development Site Plans* as prepared by Stamski & McNary, Inc., dated July 11, 2018 (13 sheets)
- *Landscape Plan* as prepared by Kim Ahern Landscape Architects for Stamski and McNary, Inc., dated June 28, 2018 (1 sheet)
- *Site Evaluation*, as prepared by Stamski and McNary, Inc., undated (3 pages)
- *Pre Development Drainage Map and Post Development Drainage Map* as prepared by Stamski and McNary, Inc., dated July 2, 2018 (2 sheets)
- *Stormwater Management Report For 1440, 1450, 146b Main Street, Concord, MA*, as prepared by Stamski and McNary, Inc., dated July 2, 2018 (263 pages)

Second Peer Review

The following additional documents were submitted by the Applicant in July of 2019 and serve as the basis for this second Stormwater Design peer review:

- *Revision Letter*, as prepared by Williams Sparages, dated July 16, 2019 (5 pages)
- *Definitive Site Plan for Center & Main A Planned Residential Development at 1440 & 1450 Main Street* as prepared by Williams Sparages, dated December 6, 2018 and revised through June 14, 2019 (12 sheets)
- *Existing Watershed Map and Proposed Watershed Map* as prepared by Williams Sparages revised June 14, 2019 and July 11, 2019 (2 sheets)
- *Stormwater Report* as prepared by Williams Sparages dated July 11, 2019 (466 pages)
- *Post-Development HydroCAD Nomenclature Map* (1 sheet)
- *Floor Plans and Elevations* as prepared by Elise Bracer Stone Architects dated March 10, 2019 (30 sheets)
- *Landscape Plan* as prepared by Kim Ahern Landscape Architects dated June 12, 2019 (1 sheet)

GPI has reviewed the above documentation for compliance with the Massachusetts Wetlands Protection Act and regulations (“the Act”), the 2008 MassDEP Stormwater Handbook (“the Handbook”), the Town of Concord Stormwater Regulations (“the Regulations”) and the Concord Public Works Design & Construction Standards & Details (“the Standards”), National Pollutant Elimination Discharge System (NPDES), and general engineering practices. The review assessed the level of completeness of the submitted information based on the Town’s requirements, determined whether proposed methods are correct and consistent with standard engineering practices; and whether the design will adequately protect the wetland resource areas, abutting properties, and maintain existing stormwater flows.

Project Understanding

Based on the documentation submitted to the Town and made available to GPI, GPI understands that the Project consists of the construction of 37 residential dwelling units (36 as part of a Planned Residential Development and 1 ANR Lot), associated private driveways, open space, walking paths, sidewalks, landscaping, town water, limited town sewer, a Title V on-site subsurface sewage disposal system, underground utilities, and a drainage system for conveyance and attenuation and treatment of stormwater runoff.

It should be noted that the design has been revised substantially since the original submission made available to GPI for review in August of 2018. Some of the initial peer review comments still apply, while others are no longer applicable to the new submission documents. The comments from the initial review have been included in this letter, along with an indication of the current status as either Addressed, Outstanding, or No longer applicable to the revised design. New comments based on the revised submission are also provided herein.

SECTION 1: INITIAL REVIEW – STORMWATER DESIGN COMMENTS

1. In accordance with Section 2.2.1(D) of the Standards, all stormwater designs and calculations shall be completed for the 2-year, 10-year, 25-year and 100-year frequency, Type III, NRCS 24-hour rainfall distribution. The stormwater calculations submitted by the Applicant do not include the 25-year frequency storm. The Applicant shall revise the stormwater calculations to include the 25-year storm event.

[ADDRESSED] - The Applicant has revised the stormwater calculations to include the 25-year storm event. This comment has been addressed.

2. In accordance with Section 2.2.3 (A.6) of the Standards, the Applicant shall provide the depth to groundwater at each test hole location on the Existing Conditions Plan.

[OUTSTANDING] - Depth to groundwater at test holes is not provided on the Existing Conditions Plan. This comment has not been addressed.

3. Details for the subsurface infiltration structures should include the assumed/interpolated depth to estimated seasonal high groundwater (SHGW) elevation. Since test pits did not occur within the location of many of the infiltration structures, the applicant should indicate what the seasonal high groundwater elevation has been assumed to be at each location where infiltration is proposed, and how the elevation was determined. The Applicant should include the SHGW elevation on the details for each structure.

[OUTSTANDING] - Additional test pits have been performed at the locations of proposed subsurface infiltration areas. GPI recommends that the Applicant include on the plans the estimated SHGW elevation at the location of each subsurface infiltration system for clarity.

4. The project proposes infiltration to control peak flows, provide groundwater recharge, and meet the TSS removal requirements of the MassDEP Stormwater Handbook. The Applicant has performed several soil test holes throughout the project area. The Handbook and Sections 2.2.3 and 2.2.4 of the Standards require that test holes be conducted within the footprint of proposed recharge areas. Soil test holes have not been performed within the footprint of the following recharge areas: SMA-1, SMA-3, Drywell-B, Drywell-C, Drywell-D, Drywell-E, Drywell-F, SMA-2, and the proposed infiltration trench. It should be noted that in some areas, test holes are located relatively close to the proposed recharge areas. The soils discovered within the test holes that were performed appear to contain consistent soil textures and there is limited variability between each test hole. Based on the soil logs submitted, the test holes were witnessed by the Board of Health. The Town may choose to require that test holes be performed within the footprints of proposed recharge areas, as stated in the Standards. Given the consistency of the soils throughout the site, it would be reasonable to assume that the soils within the proposed infiltration areas are similar to those discovered in the test holes. GPI suggests that the Town consider a condition that requires the Contractor to perform test holes witnessed by the Town or its' representative to confirm the soil conditions within areas of proposed infiltration prior to constructing the infiltration BMPs.

[COMMENT IS NOT APPLICABLE TO THE REVISED DESIGN]

5. Section 2.2.3(E.1.) of the Standards requires that the drainage design narrative include a summary table which clearly compares pre-development and post-development runoff rates and volumes at each analysis point. The Applicant has summarized the runoff rates in each condition, however the volumes are not included. The Applicant shall revise the narrative to include a summary of the runoff volumes at each analysis point in the pre- and post-development conditions.

[ADDRESSED] - The drainage design narrative includes a summary of the runoff volumes at each analysis point. This comment has been addressed.

6. Section 2.2.3(D.) of the Standards requires that a Rational Method Divide Plan be provided, showing subcatchment areas for each conveyance BMP. The Applicant has provided Rational Method calculations, however a plan showing catchment areas for each conveyance structure is not provided.

[OUTSTANDING] - Since the original submission made available to GPI for review in August of 2018, the overall site layout and closed drainage system has been revised substantially. Rational Method calculations (Section 2.2.1F of the Standards) and a corresponding Rational Method Divide Plan (Section 2.2.3D) for the new design have not been provided for review.

7. Section 2.2.4(E.) of the Standards requires that safe overflow of underground infiltration systems be provided in the event of severe storm events or clogging of the soils surrounding the device, and that discharge of the overflow be incorporated into the drainage design. The proposed underground infiltration systems have not been designed with an overflow. The Applicant shall clarify the intent of the design as it relates to overflow and incorporate an overflow into the design of these systems. It should be noted that the design of these systems is based on the 100-year storm event and assumes that infiltration will occur at 8.27 inches per hour, based on soil textural analysis. In the event of clogging of the soils or an in-situ infiltration rate that is slower than the high rate that has been assumed, overflow should be provided, as required by the Standards.

[ADDRESSED] – The revised design includes an overflow and discharge for the underground infiltration systems.

8. The Applicant is proposing to use two (2) models of the Stormtech Chamber System; the SC-740 and the MC-4500. While the details and plans appear to detail the proposed systems correctly, the hydrology report labels all of the chambers as the SC-740 chamber. It appears that the calculations do use the correct chamber dimensions and sizing regardless of the incorrect naming. The Applicant

should clarify and revise the report to include the name of the actual chambers to be used for each system.

[COMMENT IS NOT APPLICABLE TO THE REVISED DESIGN]

9. The detail for SMA-1 provides rim and invert data for DMH-17. The rim elevation, pipe sizes, and inverts do not match the plan and profile provided.

[COMMENT IS NOT APPLICABLE TO THE REVISED DESIGN]

10. The detail for SMA-2 provides rim and invert data for DMH-12. The rim elevation and pipe data do not match the plan and profile provided.

[COMMENT IS NOT APPLICABLE TO THE REVISED DESIGN]

11. The detail for SMA-3 provides rim and invert data for DMH-13. The pipe data and inverts shown do not match the plan and profile provided.

[COMMENT IS NOT APPLICABLE TO THE REVISED DESIGN]

12. The Layout & Utilities Plan shows several "typical" area drains. The Applicant should provide structure and pipe data as well as a detail for the proposed area drains.

[COMMENT IS NOT APPLICABLE TO THE REVISED DESIGN]

13. The Post-Development Drainage Map indicates that the southeastern portion of the lot nearest the corner of Main Street and Highland Street contributes runoff to the subsurface infiltration chambers identified as SMA-2, within the P-2 catchment area. It is not clear how runoff from this lot is routed to this BMP. It does not appear that any area drains are proposed to capture this runoff, and the grading indicates that stormwater would be contained within the site. The Applicant should clarify the intent and why a drywell is not proposed for the roof runoff in this area in the way drywells are provided for the remainder of the roof runoff in the project area.

[COMMENT IS NOT APPLICABLE TO THE REVISED DESIGN]

14. A Pipe End detail is provided on the plans. It is not clear where the Pipe End is proposed. The Applicant should clarify the intent.

[COMMENT IS NOT APPLICABLE TO THE REVISED DESIGN]

15. The Applicant has claimed between 80% and 90% TSS Removal by the proposed proprietary pre-treatment units. This Removal Rate appears to be overestimated based on data available on the DEP review of similar units. The Applicant should provide documentation from third-party testing confirming this assumption, as required by the Handbook and indicated on the Stormwater Checklist. Otherwise the Applicant should reduce the assumed TSS Removal rate to be consistent with an accepted rate of TSS Removal for these units based upon MassDEP standards, and provide documentation supporting the rate of removal.

[COMMENT IS NOT APPLICABLE TO THE REVISED DESIGN].

16. The Post-Development Drainage Map identifies Subcatchment Area D-2, which includes a driveway from which runoff discharges to a proposed infiltration basin. Neither the Subcatchment Area nor the Infiltration Trench are included in the hydrologic report or supplemental calculations. The Applicant shall include the Subcatchment area and Infiltration Trench in the report and calculations.

[COMMENT IS NOT APPLICABLE TO THE REVISED DESIGN]

SECTION 2: INITIAL REVIEW – NPDES COMPLIANCE REVIEW COMMENTS

1. The Applicant has submitted a Long-Term Operation and Maintenance (LTO&M) Manual, including an Operation and Maintenance Plan and a Sample Inspection Log. In accordance with the Standards, the Long-Term Operation and Maintenance Plan shall include a plan outlining the location of and access points to all BMPs proposed. The plan shall be prepared for this purpose and clearly depict these locations. A plan shall be included with the LTO&M manual to be used as a stand-alone document once construction is completed.

[OUTSTANDING]

2. The Applicant shall include the proposed Infiltration Trench in the Stormwater Operation and Maintenance Plan and Inspection Log.

[COMMENT IS NOT APPLICABLE TO THE REVISED DESIGN]

3. The Applicant has submitted a Stormwater Pollution and Prevention Plan (2 sheets). The plan includes pollution prevention measures to be provided during the construction period. On the same sheet, the plan also lists the Long-Term Pollution Prevention and Drainage and System Operation and Maintenance Plan. GPI recommends that the Applicant provide separate plans for the Construction Period Pollution Prevention and the Long-Term Pollution Prevention. The Construction Period Pollution Prevention Plan shall include Construction Sequencing in addition to the sedimentation and erosion controls proposed. The Long-Term Pollution Prevention Plan shall indicate locations of BMPs to be inspected and maintained and be included as part of the O&M Plan.

[OUTSTANDING]

4. The Applicant shall include manufacturer's literature on maintenance of the pre-treatment units and the subsurface infiltration chambers and Isolator Row. The literature shall be included with the Long Term Operation and Maintenance Plan.

[ADDRESSED]

5. The Applicant has indicated that the project is covered by a NPDES Construction General Permit but no SWPPP has been submitted, and that the SWPPP will be submitted BEFORE land disturbance begins.

[NO ACTION NEEDED]

6. The Applicant has indicated that No Illicit discharge compliance statement is attached but will be submitted prior to the discharge of any stormwater to post-construction BMPs.

[NO ACTION NEEDED]

7. The linetype used for the siltation barrier shown on the Stormwater Pollution Prevention Plan shall be revised so that the Legend and Plan depict the same linetype to avoid confusion.

[COMMENT IS NOT APPLICABLE TO THE REVISED DESIGN]

8. The Stormwater Pollution and Prevention Plan incorrectly labels the Wetland as a BVW, while documentation provided indicates the wetland is an Isolated Wetland. The Applicant should revise this plan to be accurate and consistent with the rest of the plans and information submitted.

[COMMENT IS NOT APPLICABLE TO THE REVISED DESIGN]

9. The Standards require that no erosion control measures shall be designed to be installed within the footprint of BMPs designed to provide permanent infiltration. The Applicant shall show the areas of permanent infiltration BMPs on the Stormwater Pollution Prevention Plan and provide applicable notes directing the Contractor to avoid use of erosion control measures or unnecessary compaction or smearing in these areas. As shown, it appears that areas proposed as temporary sediment basins are within the footprint of some proposed permanent infiltration BMPs.

[ADDRESSED]

10. The Applicant shall submit written authorization from the property owner for representatives of the Town to enter the site to inspect erosion and sedimentation control measures during the period of land disturbance.

[OUTSTANDING]

Revised Submission Review – New Stormwater Design Review Comments

1. In accordance with Section 2.2.1 (F), storm drain capacity calculations shall be performed for all conveyance BMPs. Capacity calculations shall be provided utilizing the Rational method for a 100-year frequency storm event. Rational method calculations have not been provided. In accordance with Section 2.2.3(D), a Rational Method Divide Plan is also required.
2. The Topographic Plan (Sheet 4), Utility Plan (Sheet 5), and Plan and Profiles (Sheets 6 and 7) provide labels for only some of the drainage structures proposed. Most structures are not labeled and no detailed information is provided. At least two of these structures contain duplicate labels (DMH D). Additionally, not all of these structures are shown on the Profile Plans (Sheets 6 and 7) and structures are mislabeled or not labeled at all in several cases. This makes it difficult to review the design and confirm appropriate structure elevations and inverts for the closed drainage system, stormwater management system, and bypass and overflow devices.
3. The Profile on Sheet 7 does not show elevations along the vertical axis.
4. GPI recommends that the Applicant provide a detail for each Stormwater Management Area proposed and inverts and elevations for the related drainage, pretreatment, and bypass structures associated with them, along with the test pit information summarized for the location of each SWMA, so that design elevations are clear. Some of the systems are shown on the plan and/or the profile and HydroCAD model, but there are several inconsistencies, including the following:
 - a. Plan and Profile Sheet 6 shows the overflow elevation from SWMA 1P at 150.25. Table 9.0 in the Stormwater Report indicates that the overflow elevation is at 150.00. The inlet from the manifold is at elevation 150.25. Please correct the discrepancy and clarify the intent.
 - b. A structure labeled DMH 3 is shown on the Profile on Sheet 6 but is not shown on the plan.
 - c. The Profile on Sheet 6 indicates the invert out of CB3 and CB4 is 139.70. The downstream DMH (unlabeled on the plan and profile) is labeled with an invert in of 140.00 and invert out of 139.90, which would indicate reverse flow.

- d. Plan and Profile Sheet 6 labels the SWMA at Station 4+35 as SWMA 6P. Based on the locations of the SWM areas shown on the plans, it appears that this should be SWMA 7P. The overflow elevation on the profile is shown as 131.25, which is consistent with the overflow elevation for SWMA 6P in Table 9.0 of the Stormwater Report. However, the overflow for SWMA 7P in the Table is given as 134.25. Please clarify the labeling errors on the Profile Sheet. If the profile is intended to show SWMA-7P, please also show SWMA-6P, which is not shown on the Profile sheet, nor is any detail provided on the proposed system shown on the plan as SWMA-6P.
- e. The following stormwater management structures are not shown on the profiles, nor is there a plan or detail providing information on the system and design elevations and inverts:
 - i. SWMA-4P, SWMA-5P, SWMA-6P, SWMA-8P, SWMA-9P, and several of the proposed Drain Manholes, Catch Basins, and Oil Gas Separators.
 - ii. Sheet 7 Plan and Profile shows an unlabeled DMH at STA 10+74 connected to SWMA 2P. This DMH is not shown on the plan and it is unclear what this structure is.
 - iii. The Profile on Sheet 7 does not appear to show SWMA-3P in the correct location. It is shown between Stations 9+50 and 10+00, but based on the plan is located between Station 9+75 and 10+50.
 - iv. The Profile on Sheet 7 labels CP9 & CB10 at Sta 9+50. Based on the plan, these structures should be CB11 & CB12. If this is the case, CB9 & CB10 are not shown on the profile and no detailed information is provided. There is no detail on the structures connecting CB11 and CB12 to SWMA -4P or a detail on SWMA-4P itself.
 - v. The structure labeled as DMH D at Station 9+50 is not shown on the profile.

GPI recommends that the Applicant revise the plans and profiles to be consistent, and provide adequate details and/or labels for the design elevations of all drainage structures and stormwater management systems proposed.

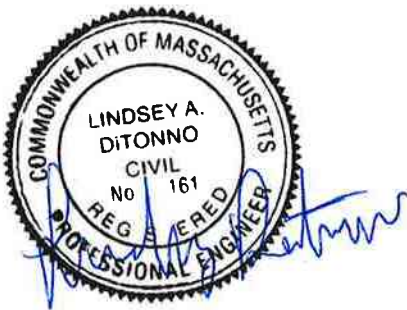
5. A Bioretention Detail is shown on the Detail Sheet; however, it is not clear where the Bioretention system is proposed. Please clarify.
6. Page 4 of the Stormwater Report indicates that recharge is provided by subsurface infiltration systems which lie within areas of loamy sand and sands, and that an exfiltration rate of 8.27 inches per hour was used. The Report also states that the site is analyzed using HSG A, B, and D soils. The HydroCAD model uses a rate of 8.27 inches per hour for all subsurface infiltration systems, regardless of location. Based on Rawls Rates, only those systems proposed in sand should be assumed to have an infiltration rate of 8.27 inches per hour. Loamy sands would be estimated at 2.41 inches per hour. Based on review, it appears that the systems may all be installed within the sand layer identified at each proposed location; however the Applicant should summarize this information more clearly for each system and confirm that the 8.27 inches per hour is appropriate for the locations of proposed infiltration areas.
7. Utility Plan Sheet 5 indicates that Lawn Area Drain AD-3 drains to Roof Drywell 4500 1R6C6, while the plan shows that it drains to Roof Drywell 3500 2R3C. The HydroCAD model does not break out A.D. 3 in a Subcatchment. Please clarify.
8. Pond 9P: 4500 1R9C: The HydroCAD model for the pond shows that it is designed as 6 chambers of the MC-3500, although it is labeled as 9 chambers. The plans show that it is designed as 12 chambers of the MC-4500. Table 9.0 of the Stormwater Report indicates that it is 12 chambers of the MC-4500 chambers. Please clarify the discrepancies and update either the model or the Report and Plan to provide consistency.
9. Pond 4P: 4500 2R10C: The HydroCAD model for the pond shows that it is designed as 2 Rows of 20 Chambers, while the label indicates that it is 2 Rows of 10 Chambers. The Utility Plan Sheet 5 shows the system as 2 Rows of 18 Chambers. These inconsistencies should be corrected so that the plans, labels, and HydroCAD model are consistent.

10. The Recharge Volume and Water Quality Volume calculations in the Stormwater Report for Pond-9P indicate that they are calculated for MC-4500 chambers. The HydroCAD model for Pond 9P utilizes MC-3500 chambers. Please clarify and correct the inconsistency.
11. Utility Plan Sheet 5 indicates with a label that Units 19, 20, & 21 are to be connected to 3500 2R3C. The plan and HydroCAD model indicate that Units 18, 19, and 20 are connected to the SWM Area. Please correct and clarify.
12. The HydroCAD model indicates that CB11, CB7, CB13, and DMH K discharge to SWMA-5P. It is not clear on the plans that CB11 discharges to SWM-5P, and DMH K is not labeled anywhere on the plans. Please clarify or correct the structure labeling or locations.
13. The HydroCAD model does not include the overflows and their respective discharges to the resource areas from the SWM Areas. The model assumes that there is not outlet provided beyond the exfiltration modeled at each SWMA. The model should include the overflow outlets from the SWM Areas so that the model is consistent with the design.
14. The Applicant has included drawdown calculations demonstrating that stormwater for all design storms will be completely infiltrated within 72 hours.
15. The Applicant has included forebay (Isolator Row) sizing calculations for the prescribed water quality volume.

GPI is appreciative of the opportunity to assist the Town of Concord with the review of this Project. Should you have any questions, or require additional information, please contact me directly at 978-570-2997.

Sincerely,

GREENMAN-PEDERSEN, INC.



Lindsey DiTonno, P.E.
Project Manager