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VIA EMAIL

Ipswich Planning Board
Town Hall
25 Green Street
Ipswich, MA 01938

RE: 126-128 High Street
Drainage and Stormwater Management Review - Task 1

Mr. Ethan Parsons and Planning Board Members:

As requested, I have conducted an initial drainage and stormwater management review of the above referenced project with respect to regulatory standards of the Planning Board and routine engineering design practice for facilities similar to that being proposed by the Applicant. Pertinent technical material received includes the following plans and documents as prepared by Graham Associates, Inc., of Ipswich, MA (unless otherwise noted).

- “Permit Plan of Burnham’s Landing...” consisting of four (4) sheets, all dated December 14, 2020 and revised to March 25, 2021.
- “Stormwater Management Report prepared for MMC Realty Holdings, LLC...” dated March 25, 2021.

In addition to the above, the following material was examined for background information only, but not reviewed:

- Copy of correspondence from Graham Associates, Inc., to Town of Ipswich Planning Board, dated March 25, 2021 regarding ‘Supplemental Information...’ and including a revised list of waivers and a revised ‘Table of Dimensional and Density Zoning Regulations.’
- Architectural renderings and elevations (undated).
- “Planting Plan” dated March 24, 2021 and prepared by Kris Romaniak Landscape Design.

At this time, the following comments and opinions are offered for your consideration relative to the proposed drainage and stormwater management design.

Overview: Conceptually, the stormwater management design proposed for this project is focused on collecting, treating, and infiltrating surface runoff such that post development peak runoff rates and volumes do not exceed existing conditions for the 2, 10, and 100 year design storms. Infiltration chambers are the primary best management practice utilized to achieve the stormwater management design goal. Initial stormwater treatment is provided through the implementation of deep sump catch basins and oil/grit separators. The proposal is a common approach to stormwater management, particularly when existing soils are permeable and groundwater levels are fairly deep.

While the overall design concept is suitable, there are particular issues of concern outlined in the body of this report that merit revision and clarification by the Applicant.

Stormwater Management:

1. The routing model of infiltration system 1 (IFS 1) requires revision. The design engineer should note that for higher intensity storms (10 and 100 year events), the model assumes that the entire surface area (including pavement) is capable of infiltrating runoff. This is not the case, and as a result, the calculations overestimate infiltration, and underestimate peak storage elevations and surface runoff rates exiting the site. The design engineer should refer to output values for ‘discarded’ flow (i.e., infiltration) and note that they are significantly larger than what would be anticipated.
 - a. IFS 1 is used to attenuate runoff during the 10 and 100 year storms and is located at an elevation less than four (4) feet to groundwater. As such, a mounding analysis is required in accordance with the MA DEP Stormwater Policy. The “Checklist for Stormwater Report” indicates that this analysis is provided, however, it was not found in the submitted documents. A groundwater mounding analysis should be performed and submitted.
 - b. As calculated, IFS 1 will generate some flooding within the commercial parking lot during the 10 year storm, and substantial flooding of the commercial parking during the 100 year storm. It is suggested that additional storage/infiltration capacity be provided to reduce flooding of the parking lot.
 - c. It is noted that IFS 1 is located at an elevation 2 feet above groundwater level, whereas the Ipswich Zoning Bylaw Section IX.C.7, footnote 4.b (Water Supply Protection District) stipulates that three (3) feet minimum separation is required between the bottom of infiltration system and high groundwater elevation.
2. The routing model of infiltration system 2 (IFS 2) should be revised to address warning messages contained in the 100 year storm calculation output. The design engineer should note that the peak rate of ‘primary’ outflow is greater than the inflow, which is indicative of a modelling error, and that the peak flood elevation is significantly higher than the peak storage elevation available. Appropriate adjustments should be made to the model.
3. Placement of oil/grit separators (WQI 1 and 2) should be revised and reconfigured such that the separators operate ‘off-line’ in accordance with MA DEP Stormwater Standards (Volume 2, Chapter 2).
 - a. An access manhole should be provided between each WQI and the adjacent IFS distribution lines.
 - b. Revised piping alignment is suggested between WQI 1 and IFS 1 to ensure even distribution of flow between both chambers without backflow within the WQI.
 - c. Pool storage in the first chamber of each WQI should be sized in accordance with the MA DEP Stormwater Standards contained in Volume 2, Chapter 2. Calculations should be submitted to confirm adequate sizing.
 - d. The WQI detail should specify the units to be watertight and to have a watertight seal between internal chambers.
4. Dry well systems for roof runoff (DW 1 thru DW 6) are situated such that a portion of the dry well is located closer than 10 feet to the proposed building foundation. MA DEP Stormwater Handbook required dry wells to be located a minimum of 10 feet from adjacent

building foundations. Revision of the dry well position should be conducted to satisfy this requirement.

- a. Calculations assume that all proposed residential roofing and the adjacent back yard is to be conveyed to the dry well systems. The plans do not indicate how the back yard will be connected to the dry wells. Additional information is required to reflect design intent.
 - b. The 100 year peak elevation with the dry wells is higher than the maximum storage elevation provided. Revision to the design and/or detail is needed to the ‘Schematic of DW Outlet Pipes’ (shown on plan 3) should be undertaken such that the 100 year flow level through these outlets does not exceed the maximum storage elevation of the DW system.
 - c. Location of the DW systems should be coordinated with architectural plans such that they avoid interference with deck foundations and stairways.
5. Additional soils testing is warranted for the proposed dry well and infiltration systems. Per MA DEP Stormwater Handbook, soils tests should be conducted within each infiltration location. Limited soils tests provided were not conducted within the proposed infiltration areas.
 6. It is noted that the sewer main servicing the resident units is proposed to be located within three (3) feet of the southerly end of infiltration system 1 (IFS 1). It is strongly suggested that greater separation be provided between these two utilities to ensure that construction or repair to one does not adversely impact the other. Furthermore, greater separation and sewer trench dams should be specified to avoid ‘piping’ of IFS 1 runoff within the sewer trench.
 7. Landscaping plans should be coordinated with the drainage plans to ensure that plantings will not conflict with infiltration systems and piping.
 8. To minimize compaction of infiltration areas, the plans should be revised to include notes and methodologies for preventing stockpiling of soil, laydown of material, and parking of construction equipment within the areas of IFS 1 and 2, and DW 1 to 6. Similar language should be added to the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan (CPPPP).
 9. The following notes should be added to the plans:
 - a. Metal roofs shall be prohibited from use on the site (reference MA DEP Stormwater Handbook Volume 1 Chapter 1 and Ipswich Zoning Bylaw Section IX.C.7).
 - b. All residential roof runoff shall be conveyed to dry wells (DW 1 to 6) in accordance with the assumptions of the stormwater management design.

Site Grading & Drainage:

1. The driveway entrance and the southeasterly corner of the commercial parking field are graded with an excessively flat slope. Revision should be conducted to provide a minimum slope of 0.8 percent on all paved surfaces.
2. Revision should be provided to contours 40 and 41 to reflect what is presumed to be a ‘crowned’ driveway (similar to that shown at contour 39).
3. Numerous spot grades, ridge lines, and flow arrows should be added to the site plan to reflect the flow directions presumed in the stormwater management calculations.
4. An existing drain manhole is shown in the northeasterly corner of site with a pipe directed southwesterly, into the site (refer to the ‘Existing Conditions’ plan sheet 1). No specific destination of the pipe is specified. The outfall and route of the existing pipe through the

- site should be further investigated and identified, to ensure that no interference or conflict exists with the proposed drainage and stormwater design.
5. The design engineer should provide hydraulic calculations to verify the adequacy of the 8 inch pipes proposed for use in the design.
 - a. Particular consideration should be given to the headwater generated at the 8 inch pipe segments during the 10 and 100 year storm event and the resulting surface flooding that is created.
 6. The change in direction in pipe segment 'D7' and the junction between pipe segments 'D2' and 'D5' should be provided with a manhole at the change of pipe direction and pipe junction, respectively.
 7. The design engineer should confirm the ability to construct CBs 4 and 5, and DMH 1 given the shallow pipe inverts specified at these structures.
 - a. It should also be confirmed that the specified pipe has adequate strength to support traffic loads with the shallow cover indicated. Notation should be made on the plans to protect these pipes during construction of the driveway and parking area.
 8. "Drainage Data" table on sheet 3:
 - a. Revise finished grade specified for IFS 2. Per manufacturer's recommendation, provide 24 inches of cover in unpaved sections where rutting is a concern.
 - b. Revise invert, pipe size, and/or WQI 2 detail to clarify the ability to install pipe segment 'D9' (12 inch PVC pipe) at WQI 2.
 - c. A pipe overflow is specified at DW 2 and DW 3, however, no overflow pipe is indicated on the plans. This discrepancy should be addressed.
 - d. Overflow pipes from IFS 1 and 2 (pipe segments 'D4' and 'D10' respectively) have a crown elevation that is higher than the top of chamber system. A detail should be provided to demonstrate how the outlet connection is installed.
 9. The Catch Basin Detail on sheet 4 should be revised to include the 'hood' specification identified in the 'Drainage Notes' on sheet 3.
 10. Provide erosion control details for perimeter erosion protection, silt sacks to be used at catch basins, and a stone construction entrance.

DEP Stormwater Management Items:

With respect to the DEP Stormwater Management Standards, no exception is taken to the Applicant's assertion that the proposed project can be classified as a 'redevelopment project.' As such, the following items are noted:

1. Standard 3 – IFS 1 is provided with less than four (4) feet separation from high groundwater levels and is utilized to attenuate the 10 and 100 year storm events. As such, a mounding analysis is required.
2. Standard 4 – Sizing calculations should be provided to verify adequate sizing of the pool chamber of each WQI.
3. Standard 4 – Revise the Long Term Pollution Prevention Plan (LTPPP) to address the following requirements of the "Checklist for Stormwater Report"
 - a. Spill prevention and response plans,
 - b. Maintenance of landscape areas,
 - c. Pet waste management,
 - d. Prevention of illicit discharges to the stormwater management/drainage system,

- e. List of emergency contacts and training of personnel involved with implementing the LTPPP.
4. Standard 6 – The submitted “Checklist for Stormwater Report” indicates this standard to be not applicable. However, the fact that the site is located in Water Supply Protection District Zone II warrants that Standard 6 is applicable. As such, the long-term pollution prevention strategies must incorporate design that allow for “...shut down and containment where appropriate to isolate the system in the event of an emergency spill or other unexpected event...” Appropriate revision should be made to the LTPPP and the stormwater management design.
5. Standard 7 (redevelopment) - The submitted “Checklist for Stormwater Report” indicates certain standards are not met and that an explanation is provided in the Stormwater Report as to why these standards are not met. The identification and explanation regarding which standards are not meet was not found in the documents submitted. Additional information should be submitted to address this issue.
6. Standard 8 – The Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan (CPPPP) is satisfactory as submitted.
7. Standard 9 – The following revisions/additions should be provided in the Post Construction Operation and Maintenance Plan (O&M):
 - a. Add reference to design plans of record and future as-built plans which should be appended to the document for ease of future reference.
 - b. Revise inspection frequency of the Sediment and Oil Separators to monthly, with cleaning provided twice annually (per MA DEP Stormwater Handbook).
 - i. Water Quality Inlet, Grit/Oil Separator, and Sediment/Oil Separator are all used as interchangeable terms in the plans and documents. Revise to provide a consistent singular term in all references.
 - c. Add dry wells, roof drains, gutters, and leaders to the O&M plan and Log Form. Inspection should be conducted after every major storm event for the first year of operation, and annually thereafter (per MA DEP Stormwater Handbook). Cleaning regimen for roof gutters should also be specified.
 - d. Infiltration Basins should specify inspection at least twice a year (per MA DEP Stormwater Handbook) rather than every two years.
 - e. The Log Form should be revised to include an additional column for “Inspection Date” (because the service/maintenance dates and the inspection dates may not necessarily coincide).
8. Standard 10 - An 'Illicit Discharge Compliance Statement' should be provided with the project documentation, as indicated in the submitted “Checklist for Stormwater Report.”

Please feel free to contact me if you have any questions or require any additional clarification of the above comments and opinions.

Very truly yours,

R.E. Puff

Robert E. Puff, Jr., PE

cc: Larry Graham, PE (via email)