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August 18, 2016

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**Subject: Estates at Bull Meadow, Appaloosa Drive
Wetlands Bylaw Regulations and Stormwater Regulations Review**

Dear Maria:

We received the following documents in our office June 13, 2016:

- Correspondence from McCarty Engineering, Inc. to Town of Grafton Planning Board dated June 10, 2016, re: Definitive Subdivision, Estates at Bull Meadow.
- Plans entitled Definitive Conventional Subdivision Plans; Estates at Bull Meadow; North Grafton, Massachusetts dated June 10, 2016, prepared by McCarty Engineering, Inc. (25 sheets)
- Bound Document entitled Drainage Report: Estates at Bull Meadow Definitive Subdivision, North Grafton, Massachusetts dated June 10, 2016, prepared by McCarty Engineering, Inc.
- Waiver Request Form for Estates at Bull Meadow-Definitive Subdivision dated June 10, 2016.
- Definitive Plan Application Packet-Grafton Planning Board dated June 10, 2016.
- Environmental & Community Impact Analysis-Estates at Bull Meadow.
- Forms 11 – Soil Suitability Assessment for On-Site Sewage Disposal, Massachusetts Department of Environmental Protection.

We also received the following documents in our office via e-mail on July 1, 2016:

- WPA Form 3 – Notice of Intent for property at 109 Adams Road, applicant Bull Meadow, LLC.
- Site Locus Map, Figure 1.
- Correspondence from Massachusetts Division of Fisheries & Wildlife to Bull Meadow, LLC dated August 13, 2014.
- National Flood Hazard Layer Official Map of the project area and surrounding area.
- Application for Permit, Grafton Wetland Bylaw for property at 109 Adams Road, applicant Bull Meadow, LLC.

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Graves Engineering, Inc. (GEI) has been requested to review and comment on the plans' and supporting documents' conformance with applicable Town of Grafton "Regulations for the Administration of the Wetlands Bylaw", Town of Grafton "Regulations Governing Stormwater Management", MassDEP Stormwater Handbook and standard engineering practices. GEI was authorized to proceed with this review on July 14, 2016.

GEI previously reviewed the plans and supporting documents on behalf of the Grafton Planning Board and issued a peer review letter dated July 19, 2016. Comments in our letter to the Planning Board that are also germane to this review have been incorporated herein (e.g. compliance with MassDEP Stormwater Handbook).

Our comments follow:

Regulations for the Administration of the Wetlands Bylaw

1. The locations of wells on abutting properties were not shown on the plans. (§V.B.3(e))
2. On Sheet 10 of the plans, the horizontal layout of the replication area is shown but no proposed topographic information was provided and the replication area is located partially outside the limits of the existing conditions topographic survey. (§V. B.5(b) & §V. C.1(a))
3. The top of the berm at the two infiltration basins is only seven feet wide whereas the minimum width must be either ten feet or twelve feet, depending upon whether the berm is to be used for access. (§V. B.5(h)(2))
4. Fences have not been proposed at the two infiltration basins. (§V. B.5(h)(3))
5. Eighty percent total suspended solids (TSS) removal will not be achieved prior to the stormwater leaving the forebays and entering the infiltration basins. With 25% TSS removal from the catch basins and another 25% from the forebays, only 44% TSS removal will be achieved when stormwater enters the infiltration basins. (§V. B.5(h)(10))
6. Retaining walls are proposed within the Paddock Ridge Drive right-of-way between stations 12+50± and 14+45± and a waiver from the Subdivision Rules & Regulations was requested. We understand that the Town of Grafton requires retaining walls to be outside the rights-of-way. (Schedule E, Standard Cross Section Minor Street B). Furthermore, there needs to be sufficient room on the road shoulders to allow for proposed or future utilities, guard rails, fences, ancillary wall construction materials (e.g. geogrids, if used) and sufficient grass area for the temporary storage of snow. The allocated width at this crossing does not appear to be adequate as currently proposed. (§V.C.2)

Regulations Governing Stormwater management

7. Erosion control barriers need to be provided along the base of the roadway fill slopes between Bridle Ridge Drive and Lots 5 and 6. (§7.B.2.c)

Stormwater Management & Hydrology Review

8. Access to Infiltration Basins 1 and 2 needs to be revised. The minimum top-of-berm berm width needs to be ten feet and the access grade can't exceed 20%. The tops of the berms are proposed to be approximately seven feet wide and the grade at Infiltration Basin 2 is approximately 33% (3H:1V).
9. Calculations must be provided to demonstrate the infiltration forebay size in Infiltration Basins 1 and 2 comply with DEP Stormwater Management Guidelines.
10. The two infiltration basins will only have approximately 0.8 feet of freeboard as measured between the 100-year peak water surface elevation and the top of the berms; at least one foot of freeboard needs to be provided.
11. The plans should clearly show that the sides of the riprap spillways and down-gradient aprons are to also be lined with riprap in order to avoid erosion along the spillways' edges.
12. The riprap spillway elevations need to be labeled at Infiltration Basins 1 and 2.
13. Soil testing has not yet been performed at Infiltration Basin 2 to demonstrate compliance with MassDEP's required two-foot offset to seasonal high groundwater. Based upon the soil testing data that was submitted (for fifteen building lots and Infiltration Basin 1), the proposed elevation for Infiltration Basin 2 does not appear to be unreasonable. Nevertheless, soil testing will have to be performed at infiltration Basin 2.
14. The Area 2A label on the Existing Conditions Watershed Plan should be removed. This label applies to the proposed conditions.
15. There is an unlabeled area shown on the Proposed Conditions Watershed Plan in front of Subcatchment Lot 13.
16. It is necessary to provide appropriately-sized riprap aprons at drainage system discharge points. Additionally, supporting calculations relative to the apron dimensions and riprap stone size must be submitted.
17. Sheet 10 refers to an infiltration basin while Sheet 12 refers to the same structure as a detention basin. The labels on the plans should be consistent and should follow MassDEP nomenclature.

General Engineering Comments

18. On Sheet 21, the floor fill in the precast drain manhole construction detail needs to have a channel as opposed to being a planar surface.

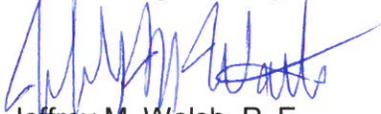
General Comments

19. It is recommended for clarity that the existing conditions plans (Sheets 1 and 2) be revised so the underlying gray existing conditions lines are black.

20. Although the boundary of the development was drawn on the plans, it is difficult to distinguish the boundary from other interior and exterior lot lines. The boundary should be a heavier line type.

We trust this letter addresses your review requirements. Feel free to contact this office if you have any questions or comments.

Very truly yours,
Graves Engineering, Inc.



Jeffrey M. Walsh, P. E.
Vice President

Cc: Brian Marchetti, P.E., McCarty Engineering, Inc.