Professional Services Corporation, PC

Engineering Review of Definitive Subdivision Plan for

Hillside Estates

21 High Street Extension

Ashland, MA

February 23, 2016

Engineer/Surveyor
GLM Engineering Consultants
19 Exchange Street
Holliston, MA 01746

Owner
John & Margot Ellsworth
22 High Street Extension
Sudbury, MA 01776

Applicant
Richmond Development Corp.
48 Frankland Road
Ashland, MA 01721

Location
South of the extension of High Street and west of Orchard Road via 50 foot wide access.

Zoning Districts
Residence RA

Content
Site Plan set -13 sheets;
Stormwater Runoff Analysis

Assessors' Reference
Map 19, Parcel 40

INTRODUCTION

Professional Services Corporation (PSC) reviewed the "*Definitive Subdivision Plan 'Hillside Estates' Ashland, Massachusetts"* application prepared by GLM, Holliston, Massachusetts and dated December 28, 2015. The project is proposed on a parcel identified as assessors Map 19, Parcel 40 in the Residence A district. The parcel contains 17.98 acres of partially developed land off the extension of High Street and off Orchard Road via 50 foot wide access. The site contains a single residence, accessory building and shed which are proposed to remain.

The proposed project consists of fifteen (15) single family lots, supporting roadway and infrastructure to be developed as a conventional subdivision, pursuant to Chapter 344 of the Code. The underlying zoning is Residence-A (RA) with 30,000 square-foot lots. The units will be served by two roadways that are designed as Minor Streets with reduced pavement of 26-feet and Cape Cod berm edging. Each roadway will include a bituminous sidewalk.

A Bordering Vegetated Wetlands (BVW), 25-foot No Disturb Buffer and 100-foot buffer extends along the western edge of the locus.

Utilities, including water, telephone and electric service will be extended into the site from High Street and Orchard Road. An 8-inch water service will be looped through the project with connections to existing water mains in both streets. Sewer service will extend from the project across a proposed easement to an existing manhole in Pennock Road

The stormwater management system proposes a conventional closed conveyance system that discharges to a proposed detention/retention basin in the southerly corner of the project, and through an outlet pipe toward the BVW off-site

Per review of the *Flood Insurance Rate Map (FIRM),* Community Panel *25017C0513F,* the project is located outside mapped flood plains. No other resource areas were indicated on the MassGIS Oliver website.

BASIS OF REVIEW

Our evaluation is based upon review of the following:

A. Review of the site plan entitled "*Definitive Subdivision Plan 'Hillside Estates' Ashland, Massachusetts"* application prepared by GLM, Holliston, Massachusetts and dated December 28, 2015 and consisting of thirteen (13) drawing sheets.

B. Review of Stormwater Management Report including review of "Stormwater Management Report – Hillside Estates Ashland, Massachusetts" dated December 28, 2015 prepared by GLM Engineering Consultants, Holliston, MA.

C. Review of "Notice of Intent for Definitive Subdivision Plan 'Hillside Estates' Ashland, Massachusetts" dated December 28, 2015 prepared by GLM Engineering Consultants, Holliston, MA.

D. Review of "Definitive Subdivision Plan 'Hillside Estates'; Applicant: Richmond Development Corp.", dated December 28, 2015, prepared by GLM Engineering Consultants, Holliston, MA. addressed to the Ashland Planning Board with a narrative description of the project and a list of requested waivers.

E. Review of "Form C – Application for approval of definitive subdivision plan", dated December 30, 2015.

F. Review of "Application for Stormwater Permit", dated December 30, 2015 including Stormwater Management Permit Eligibility Worksheet and Certified List of Abutters to Map 19, Parcel 40, as compiled November 3, 2015.

G. Review of the Flood Insurance Rate Map (FIRM), Community Panel 25017C0513F, issued July 7, 2014.

H. Review of the Zoning Map of the Town of Ashland, Massachusetts as revised.

I. Review of the Code of the Town of Ashland, Massachusetts as amended.

J. Review of the Zoning By-laws of the Town of Ashland, Massachusetts as amended.

K. A field reconnaissance of the property.

ROADWAY GEOMETRY

1. Profile elevations should be provided every 25 feet through vertical curves. §344-8.B.(11)(c).

2. A 75-foot leveling area held at 3% grade (or less) is required at all intersection approaches. The proponent is requesting waiver from the leveling requirement in §344-12.C.(2) at both ends of the proposed road connecting Orchard Road to the High Street Extension Road inside the project. Waiver is requested to allow a reduced leveling area of 45 feet at Orchard Road and 63 feet at the proposed High Street Extension Road.

3. The required 250-foot sight distance for minor street design is equivalent to 35 MPH design speed and required K values of K=49 in sag vertical curves and K=29 in crest vertical curves. The High Street Extension vertical curve between Sta. 4+00 and Sta. 5+00 (Ksag=40) should be increased in length to provide the 250-foot stopping sight distance. Also, both vertical curves in the Orchard Road connector do not provide sufficient stopping sight distance (Ksag=21.43 and K_{crest}=21.43). Both vertical curves should be increased in length. §344-12.D.

4. Although an additional maintenance item, the by-law requires that cul-de-sacs are required to be designed with interior islands. §344-8.F.(4).

5. Temporary Street names should be assigned to the roadways (Road 'A', 'B', etc.). §344-12.H.

6. The plan should include all existing curb cuts and driveways within 350 feet from the exterior lines of the proposed subdivision §344-7.C.(12).

7. Driveway grades are not permitted to exceed 6% within 20 feet of the street pavement. The Lot 14 driveway should be regraded to comply (§282-6-3.3.).

8. Most of the driveways (Lots 2-7 and 10-14) are indicated having 24-foot width pavement to the street. Driveway curb cut widths should be reduced to 12 feet for portions within the public right-of-way (plus applicable radii at the curb line).

9. All driveway intersections to roadway berms are required to be radiused granite. (§344-20.G)

10. The required pavement width for Minor Street is twenty-eight (28) feet, exclusive of curbing. A waiver is requested from §344-20.H.(2) to allow a reduction in pavement width from 28 feet to 26 feet.

11. As noted in the Typical Section on Sheet 12, granite curb is required along the radii of all roadway intersections. The typical section should be adjusted to indicate that granite is required along the edges of profile grades greater than 6%. A station-to-station note reference along the Orchard Road connector should be provided (§344-21.A.2).

WATER SUPPLY

12. The proposed water mains are designed beneath the grass strips, outside the pavement. The roadway typical section should adhere to the Department of Public Works –Water and Sewer standards and §334-57.A.(4) which specifies in all cases, water mains shall be constructed 12-feet from the property line. The typical section should be revised accordingly. Additional fittings may be required in the layout in order to approximate the 12-foot offset more closely.

13. Dead ends are not permitted. Water mains are required to extend through easements to connect to existing water mains. The proposed water main at the Lot 9 cul-de-sac should be extended across Lot 9 to the system in Pennock Road.

14. An impact study report including calculations of estimated average and peak water demand, fireflow calculations, and impacts upon the Orchard Road and High Street Extension systems should be provided (§334-39.C).

15. The fire flow calculations should demonstrate compliance with Insurance Services Office (ISO) fire flow guidelines while maintaining a residual pressure of 20 pounds per square inch (psi). Static pressure should be 60 psi desirable with a minimum 35 psi.

16. The age, condition and materials of the existing water mains in Orchard Road and High Street Extension should be provided on the drawings. The proposed pipe material should be specified and connection technique should be reviewed with the DPW Water and Sewer Division.

WASTEWATER DISPOSAL

17. The project proposes to connect to the existing town sewer system. The applicant is required to submit the design to the DPW that conforms to §326-11. The project will generate in excess of 6,500 GPD from the dwellings. The applicant should document the status of the connection permits to the existing sewer system (§326-10.B, §326-10.F).

18. Because the sewer connection from the project is new, the DPW should be consulted regarding their policy regarding inflow and infiltration elimination.

19. The project sewer will extend across Lot 9 and then across a sewer easement to connect to an existing sewer manhole in Pennock Road. The method of connection should be reviewed with the Water & Sewer Division.

20. Invert elevations should be provided for the sewer structures on Lot 9, as well as the connection to the structure on Pennock Road. The existing easement elevations are as low as elevation 321. Please verify that the sewer construction will not impact the 25-foot No Disturb Zone to the adjacent wetland.

21. The flared end section outlet from the Lot 9 stormwater basin should be designed so that no erosion of the embankment occurs above the sewer line.

22. An encasement detail should be provided at the water sewer crossing at the interior roadway intersection.

SITE/CIVIL LAYOUT

23. Both the High Street Extension and the Orchard Road connections should be completed prior to occupancy being granted for a lot that exceeds the 800-foot dead end length extension of either street (344-12.G).

24. Reserve strips prohibiting access to streets or adjacent properties are prohibited. §344-12.A.(4). Lot A between Lot 1 and High Street acts as a de-facto reserve strip. The driveway indicated on Sheet 5 currently crosses Lot A to High Street Extension.

25. Lot 1 does not provide the required 150-foot frontage.

26. The sidewalk ends at the rear of the cul-de-sac, immediately adjacent to the Lot 9 driveway. (§344-22.G). Verify that the transition from the sidewalk to the street meets ADA/MAAB grade and surfacing requirements.

27. A certification should be provided that the design is compliant with the provisions of the Massachusetts Architectural Access Board and Federal ADA requirements.

28. The plans do not provide any details for street lighting. A street light is recommended at the project intersection with Orchard Road and at the interior intersection with the High Street Extension Roadway.

29. The north arrow should specify whether true north is referenced for the project geometry §344-8.B. (2).

30. Total acreage of the site should be provided on the cover sheet (§344-8.B. (1)).

31. Street numbers should be provided on the drawings in one-half inch square, as furnished by the Inspector of Buildings §344-8.B. (5). The street names should be determined using the procedures found in §344-12H.

STRUCTURAL/GEOTECHNICAL

32. A pavement restoration/trench detail should be added to the drawings to address utility work required within Orchard Road or High Street Extension. (§326-14, §330-9, §334-58).

33. The applicant has requested waiver from the pavement construction depths of (§344-20.E). The town requires a 4-inch pavement thickness (2-inch binder course, 1-inch leveling course and 1-inch top course). The waiver requests a similar depth 2-1/2” binder course and 1-1/2” top course,

but without the intermediate leveling course placed one week prior to top course.

34. All structural manhole covers within paved areas are required to be set at top course elevation with binder 'feathering' transitioning up and around each structure. Catch basins are required to be set at binder elevation with top course feathering downward to match the binder elevation. The sanitary and drain manhole details, as well as catch basin details should be adjusted to specify this distinction (§344-20.F).

35. The entirety of the stormwater drainage will be collected in the basin on Lot 9. Under the 100-year event, this basin on Lot 9 will discharge 39.9 cu-ft./sec of flowrate at 8.13 feet per second toward the wetland. No end treatment is specified for the flared end section and the outlet is within 50 feet of the wetland. Without substantial energy dissipation, this embankment will be prone to heavy erosion.

STORMWATER DRAINAGE

36. An 18-inch RCP stormdrain system extends from the intersection of Wilber Drive and High Street Extension onto the property, discharging into the wetlands. It is anticipated that this system will remain on what is to become Lot 1. A minimum 30-foot utility/drainage easement should be provided on Lot 1 to encompass the two stormwater pipes, the intermediary stormwater manhole and drain outlet.

37. The FEMA designation on the drawings should be updated to reference the July 2014 mapping.

38. The stormwater management basin outlet is detailed. The basin profile provided on Sheet 7 should include constructed depths, details of the berm widths, slopes and a cross-section. §344- 8.B.(10).

39. Pipe capacity calculations have been provided in a spreadsheet using the rational formula which includes node by node capacities, use-to-capacity flowrate ratios, depths of flow, velocities, etc. for each pipe under the 25-year design storm. The pipe conveyance calculations utilize a default Time of Concentration (Tc) of Tc=5.0 minutes for seven of the catchbasins for the project that capture only pavement gutter flows A larger Tc=19.0 minutes was chosen for CB#1, CB#3, CB#5 and CB#7. The larger Tc values reflect longer flow lengths from the uphill portion of the project, that should be specifically calculated for contributing area.

40. Please indicate the Manning's roughness coefficient that was utilized in the pipe conveyance calculation spreadsheet.

41. Pipe velocities in the 18-inch pipe from DHM#7 are calculated in the spreadsheet as 13.21 feet/second. Similarly the design pipe velocity from CB#3 of 13.47 feet/second is too rapid. To

reduce scour from suspended sediments, pipes should be designed to convey flows a maximum 8 feet/second. Several other pipe flows are in the 10-12 fps range.

42. According to the completed Checklist for Stormwater Report in the Stormwater Management Report and calculations, the drainage basin will infiltrate stormwater within 4 feet of the seasonal high groundwater, which requires a mounding analysis. The mounding analysis was not included in the calculations.

43. Alternatively, the proximity of groundwater at the drainage basin provides an opportunity to develop a wet basin or constructed wetland with wetland vegetation providing nutrient uptake. We recommend consideration of this option.

44. No soils tests were provided beneath the stormwater basin (§343-7.6.16.c.12).

45. The drainage basin design should address frozen ground conditions.

46. In the Operation & Maintenance Plan (O&M Plan), the name and 24 hr./7 day contact information of the person responsible for the site's O&M Plan should be provided (§343-7.6.17.1.b.).

47. In the Operation & Maintenance Plan, a plan showing the location of the stormwater management components, including catch basins, manholes, and stormwater devices should be provided (§343-7.6.17.1.c.).

48. A minimum 30-foot wide stormwater management easement will be required from the cul-de-sac to encompass the basin to provide access for inspections and maintenance as well as direct maintenance access by heavy equipment (§343-7.6.17.1.e., §344-13).

49. We recommend that the drainage basin be placed on a separate parcel, not within an easement on a lot.

50. The Board may require a 30-foot stormwater easement that conforms to the alignment of the natural drainage channel along the western portion of the property (§344-13.B). preferably this would become part of the drainage parcel discussed in Comment 49.

51. The Maintenance Agreement should include a provision that the Conservation Commission be notified in event of a change in ownership (§343-7.6.17.2.a.).

52. An annual recharge calculation should be provided that demonstrates conformance to (343-8.1.5).

53. We are concerned that the subdivision road may cutoff surface and groundwater supporting the

wetland in the northwest portion of the site. We recommend incorporation of measures that will preserve hydrologic conditions supporting the northwest segment of wetlands.

54. All catchbasins in profile low points in sag curves are required to be double-grate structures. CB#3 and CB#4 should be upgraded (§344-14.C).

55. Granite curb inlets are required behind CB#8 and CB#9 (§344-21.B)

56. Cascade grate structures should be specified for CB#8-CB#11 which are on steeper profile grades.

57. The Narrative states that the project will mitigate post-developed stormwater volumes; however both the calculations and included Summary Table indicate that stormwater volumes will increase for each of the calculated design storms, which is prohibited. Increased off-site stormwater volumes are to be mitigated under (§344-14.E.) and (§344-14.F.).

58. Regular street sweeping of Orchard Road and High Street Extension should be included in the Erosion and Sedimentation Control Measures notes found in Appendix-C (Stormwater and Operation and Maintenance Plan Standard 9) of the Stormwater report.

ARCHITECTURAL

59. A temporary subdivision sign has not been proposed for the project (§282-5.3.11.3).

60. A permanent subdivision sign has not been proposed for the site (§282-5.3.11.4,5).

LANDSCAPE

61. The plans require that all existing trees fifteen (15) inches or greater in diameter in a proposed within 10 feet of intersecting existing public way, or twenty-four (24) inches in diameter in the remainder of the proposed ways should be identified on the drawings with a brief description of each tree. §344-8.B.(11)(k). A waiver has been requested from this requirement.

62. The existing commercial use (sprinkler/irrigation business) at 20 High Street Extension abuts the oversized Lot 15 (containing the existing residence) and is across the street from Lot 1. A landscape buffer may be appropriate between the use, and Lot 1 (§5.4.2.1).

63. Street trees are not indicated for either roadway (§344-29.B).

64. When provided, a watering and maintenance schedule for the street trees should be provided in the specifications on the landscape plan when submitted. A 2-year guarantee should be provided for

all plants (344- 29.B.).

65. All dead trees should be replaced within one growing season as a condition of approval.

66. The existing residence at #27 Orchard Road has side yard landscape area and trees in the rear side yard that will be impacted by construction of the new roadway grades, which according to Sheet extend outside the right-of-way. Similarly, grades extending outside the right-of-way will impact plantings in the #31 Orchard Road side yard.

TRAFFIC

67. Street sign locations should be specified on the drawings.

68. Stop signs (R1-1) should be specified at both ends of the interior Orchard Road/High Street Extension roadway.

69. A “No Outlet” sign should be provided at the internal subdivision roadway intersection for the segment leading to the cul-de-sac.

70. Sight Distance information at the Orchard Street intersection should be added to the drawings.

71. A Construction Traffic Management Plan should be provided that indicates likely routing of equipment, deliveries and haul routes.