

Andrews Survey & Engineering, Inc.

Land Surveying • Civil Engineering • Site Planning

August 10, 2016

Zoning Board of Appeals
Michael Kulesza, Chairman
Norfolk Town Hall
One Liberty Lane
Norfolk, MA 02056

**Re: Peer Review Comment Responses
Lakeland Farms – Chapter 40B
Norfolk, MA 02056
ASE Project #2014-111**

Dear Members of the Board:

Andrews Survey & Engineering, Inc. (“ASE”) has received comments submitted to your office by BETA Group, Inc., dated June 21, 2016 from their review of the above referenced project. The promptness of their review is appreciated. ASE responses to peer review comments have been provided in **bold** font below. The comment numbering has been maintained.

Civil / Site Review

1. The geometry of the proposed roadway has not been labeled. Please provide the radius and lengths of all curves on the proposed alignment for review.

The proposed roadway geometry, including radius and lengths as well as bearings and distances along the proposed alignment has been added to sheet C-3.0 of the revised Site Plan.

2. The roadway width of 22 feet is less than the Town of Norfolk Street standard. On street parking should not be permitted. Two way travel will be impacted by on street parking or stalled vehicles.

It is not the intention to provide on-street parking throughout the project, therefore "No Parking" signs along the street have been added to the revised plans.

3. The radius of the roadway, combined with the 22' pavement width, will require larger vehicles to use the full pavement width when negotiating the curve at the southern end of the development. Emergency vehicles may have difficulty passing traffic in this location. It is suggested that the applicant provide a truck turning analysis for review.

A truck turning analysis has been submitted with the revised documents.

4. The dimensions of the parking spaces have not been shown on the plans. Please verify that all spaces are at least 9' x 18'.

Typical parking space dimensions (9' x18') have been added to sheet C-3.0 of the revised Site Plan.

5. There are no stop signs indicated on the plans at the intersection with Cleveland Street or at the intersection within the development. The location of regulatory signs should be shown on the plan as well as proposed stop lines and other pavement markings.

“Stop” signage has been added to sheet C-3.0 of the revised Site Plan. In addition to the two (2) “Stop” sign locations at the proposed intersections, stop bar pavement markings have been added to the plan.

6. The construction detail for regulatory signs should note that all signs shall meet the Manual on Uniform Traffic Control Devices (MUTCD) requirements.

A note has been added to detail 4 on sheet C-7.3 of the revised Site Plan indicating that all regulatory signs shall meet the Manual on Uniform Traffic Control Devices (MUTCD) requirements.

7. The “Not a Through Street” sign has been shown on the wrong side of the street. It should be on the right side facing Cleveland Street.

The “Not a Through Street” sign has been relocated to be facing Cleveland Street on the right side of the proposed roadway as shown on sheet C-3.0 of the revised plans.

8. The sidewalks do not provide an accessible path through the development. There are numerous locations where stairs are proposed and a wheelchair accessible path has not been provided.

Though some sidewalk locations contains stairs due to the topographic conditions of the site, there in an accessible path between unit 15 and unit 16 that provides access from the central courtyard area down to the sidewalk which allows access to the proposed playground. Consideration has been given to wheelchair accessibility through the development although there is no obligation to provide ADA compliancy.

9. The plans show a sidewalk on both sides of the roadway at Station 10+00 but no wheelchair ramps or crosswalk is proposed. This appears to be a natural crossing to the playground area. BETA suggests that a crosswalk be included at this location.

Wheelchair curb ramps and crosswalk have been added in the vicinity of station 10+00 near the playground area.

10. The construction detail for the sidewalk has conflicting notations for the depth of hot mix asphalt pavement. It is noted as both 2-1/2” and 3”. Please revise.

The construction detail for the sidewalk has been revised to specify 2-1/2” total depth of hot mix asphalt pavement.

11. There are several locations where the proposed work will require the removal of ledge. A blasting plan should be submitted for review.

As blasting is anticipated to occur on site during construction, the extent has not been evaluated and the contractor to perform this work has not been selected. All blasting procedures shall conform to local, state and federal regulations, and all blasting shall be done in accordance with 527 CMR 1.00. Prior to the start of construction, a detailed blasting plan will be submitted to the appropriate agencies for review.

12. The construction detail for the concrete retaining wall has conflicting dimensions for the depth of the footing. It is noted as both 12" and 4'0". Please revise.

The poured concrete retaining wall detail is a general detail. Upon final determination of retaining wall styles and materials by the applicant, structural designs for retaining walls will be submitted prior to construction. The general retaining wall detail has been revised to resolve the conflicting dimension.

13. The construction detail for the poured concrete retaining wall shows the timber guardrail placed within the batter of the proposed wall. Verify that the guardrail posts will have sufficient clearance to the proposed wall and adjust the placement of the walls on the plans if necessary.

The placement of the proposed retaining walls has been adjusted as necessary to provide sufficient clearance for the guardrail posts. Upon final determination of retaining wall styles and materials by the applicant, structural designs for retaining walls, including guardrails, will be submitted prior to construction.

14. The plans do not show guardrail at the top of the proposed retaining wall at approximately Station 10+00. The wall location should be adjusted to allow for guardrail to be installed.

A guardrail has been added to the top of the proposed retaining wall in the vicinity of station 10+00 near the playground area. The placement of the retaining wall has been adjusted accordingly. Upon final determination of retaining wall styles and materials by the applicant, structural designs for retaining walls, including guardrails, will be submitted prior to construction.

15. The plans do not include a construction detail for the proposed boulder walls.

All retaining wall styles and materials will be determined by the applicant prior to the start of construction. All retaining walls requiring a design by a structural engineer will be submitted for review prior to the start of construction.

16. The grading plans show a drop of 4 feet or more at many of the boulder wall locations. A privacy fence is noted on the plans at some locations, but a railing or other fence should be provided.

Although the top and bottom elevation of the proposed boulder wall locations have not been called out on the plans and the grading is shown at two (2) foot contour intervals, no single boulder wall has a drop greater than 3.25'. Multiple boulder walls are proposed to limit the drop for any single location. A number of fences have been added to the revised Site Plan, specifically in areas where multiple walls are being proposed between buildings units.

17. A structural design for the poured concrete wall should be submitted for review. It is further suggested that the applicant provide a MassDOT standard masonry wall as defined by the Town of Norfolk Rules and Regulations as it is more in keeping with the character of the surrounding area.

The poured concrete retaining wall detail is a general detail. Upon final determination of retaining wall styles and materials by the applicant, structural designs for retaining walls will be submitted prior to construction.

18. There are three hydrants proposed within the development. The applicant should verify that the number of hydrants proposed and the layout is acceptable to the Norfolk Fire Department.

The Norfolk Fire Department has a copy of the plans for their review and there has been no comment or concern about the number of hydrants or layout proposed.

19. There is a fourth hydrant shown on the plans at approximately Station 11+00 that is not connected to the proposed water line. This appears to have been shown in error. Please verify.

The fourth hydrant mentioned was shown in error and has been removed from the revised plans.

20. The locations of the water and sewer services for each unit should be shown on the plans.

Proposed locations of water and sewer services have been added to sheet C-4.0 of the revised plans. The final service locations will be determined prior to and during construction under the supervision of the Norfolk Water Department and the Board of Health.

21. The applicant should provide a demand analysis to verify that the proposed 8" ductile iron water main will have sufficient capacity for the residential use and associated fire demand.

A water demand analysis was provided by the Town of Norfolk's water system consultant in a review of the proposed project dated June 7, 2016 on file with the Zoning Board of Appeals.

22. The proposed work associated with detention basin 1 along the western property line is shown all the way up to the property line. It does not seem feasible to construct the work in this area without a temporary easement from the adjacent land owner.

Detention Basin 1 has been slightly adjusted to allow more room to work up against the property line. There is a minimum distance of eight (8) feet from the detention basin to the property line, and a minimum distance of six (6) feet from the proposed level spreader to the property line.

23. The proposed playground location is bounded by the street on one side and a 7 foot high retaining wall on the other. The proposed location is fenced but BETA questions if there is a more appropriate location within the site for this facility.

Although bounded by the street on one side and a retaining wall on the other side, the proposed playground provides an attractive amenity to the proposed development. Alternative locations have been considered; however, to provide privacy to dwelling units, the proposed playground location is isolated from the majority of dwellings but still easily accessible.

Stormwater Management

- 1) **Section 3.3 Recharge to Groundwater (Standard 3)** - The Recharge Volume calculation uses 145,134 s.f. as the total impervious area. However, the HydroCAD model includes a total of only 119,621 s.f. of impervious area among watersheds 2S, 3S, 4S, 5S and 6S, which appears to include both ground surface impervious areas and roofs.

Recommendation: The applicant should review and reconcile the difference between the two (2) total impervious area values. If the greater value is accurate, the HydroCAD model (and potentially the stormwater management BMP designs) will need to be revised. If the lower value is accurate, the corresponding stormwater management report calculations will need to be revised.

The stormwater management calculations have been revised to reflect the accurate impervious areas of the proposed project. The area of 119,621 s.f. impervious surfaces as shown in the HydroCAD calculations is the correct value.

Section 3.3 Recharge to Groundwater (Standard 3) – Drawdown Time - The report states that the Drawdown Time for the infiltration basin must be calculated using the formula presented in the MA Stormwater Handbook; however, said calculation is not presented, and instead reference is made to the HydroCAD Stage-Storage Calculations for the determination of the drawdown time.

Recommendation: The applicant should follow the requirements of the MA Stormwater Handbook (Volume 3, Chapter 1) for the calculation of the drawdown time in the infiltration basin, which must be less than seventy-two (72) hours.

The calculation for drawdown time in the infiltration following the requirements of the MA Stormwater Handbook has been added to the revised Stormwater Management Report.

- 2) **Section 3.3 Recharge to Groundwater (Standard 3) – Mounding Analysis** – The mounding analysis performed for the infiltration basin includes input parameters that do not appear to correspond to the basin design from the HydroCAD model. Specifically, the Bottom Infiltrating Area in the mounding analysis is listed as 7,044 s.f., which corresponds to elevation 90.0 in the basin; per the plans and HydroCAD, the bottom of the basin is at elevation 87.0 with an area of 746 s.f. In addition, it is unclear where the length and width dimensions of the infiltration area (160 ft and 30ft, respectively) were taken.

Recommendation: The applicant should review and revise the mounding analysis to ensure that the input values used correspond to the infiltration basin as it has been designed and modeled in HydroCAD.

The mounding analysis within the Stormwater Management Report has been revised to accurately reflect the parameters of Infiltration Basin 1. The bottom infiltrating area is now listed as 1,000 s.f., which corresponds with elevation 87.0 in the basin. The length and width noted in the revised mounding analysis were taken from the length and average width of the bottom infiltrating area (elevation 87.0).

- 3) **Section 3.4 Removal of 80% TSS (Standard 4)** – Refer to Item 1 above regarding the total impervious area. In addition, it appears that the same calculation for Recharge Volume (Rv) was used

for the Water Quality Volume (Vwq) determination, as the total Vwq is identical to the Rv from the previous section (7,257 c.f.). The calculated Vwq based on the 145,134 s.f. total impervious area is 12,095 c.f.

Recommendation: The applicant should review and reconcile the difference between the two (2) total impervious area values. If the greater value is accurate, the HydroCAD model (and potentially the stormwater management BMP designs) will need to be revised. If the lower value is accurate, the corresponding stormwater management report calculations will need to be revised. In addition, the Vwq calculation should be corrected.

The stormwater management calculations have been revised to reflect the accurate impervious areas of the proposed project. The area of 119,621 s.f. impervious surfaces as shown in the HydroCAD calculations is the correct value. The Stormwater Management Report calculations for RV and Vwq have been revised as necessary. The correct Vwq required for 0.5 inch Water Quality Depth with 119,621 s.f. of impervious area is 4,984 c.f.

- 4) **Section 3.4 Removal of 80% TSS (Standard 4) – Forebay Sizing** – Refer to Item 1 above regarding the total impervious area. In addition, the forebay sizing should be limited to the impervious areas tributary to the infiltration forebay (i.e. only those in watersheds 3S and 4S).

Recommendation: The applicant should review and revise the total impervious area used in the forebay sizing calculation to reflect only the areas that shall be tributary to the forebay, and not the total impervious areas for the overall site.

Only the impervious areas tributary (watersheds 3S and 4S) to the forebay have been included in the revised Stormwater Management Report calculations.

- 5) **Section 3.9 Operation and Maintenance Plan (Standard 9)** – The O&M Plan Table of Contents lists a Best Management Locus Plan as a figure in the plan; however, the Figure was not in the O&M plan received and reviewed.

Recommendation: Submit the BMP Locus Plan for review.

The BMP Locus Plan was submitted to the Zoning Board of Appeals as part of the Operation & Maintenance Plan for the stormwater system. The BMP Locus Plan is provided in the revised documents enclosed.

- 6) **HydroCAD – Infiltration Basin Exfiltration Rate** – The infiltration basin was modeled using an exfiltration rate of 1.02 inches/hour, which corresponds to the Rawl's rate for sandy loam in NRCS hydrologic soil group "B" soils. This rate was also used in the mounding analysis (converted to 2.04 ft/day), and will presumably be used in the drawdown time calculation when it is performed.

Per the MA Stormwater Handbook regarding infiltration calculations using the Static Method, "the Rawls Rates associated with the slowest of the Hydrologic Soil Groups determined to exist at the point where recharge is actually proposed shall be used." It appears that the value was based on the presence of Swansea Muck, 0-1% (map unit symbol 51, HSG B) near, but not apparently within, the southern end of the infiltration basin. In addition, while the two test hole profiles in the vicinity of the basin (310-4 & 310-5) indicate the presence of sandy loam, that material is present only to a depth of 24-26", beneath which the material is fine sand. The infiltration area of the basin actually appears to

be wholly contained within the Charlton-Hollis rock outcrop complex (map unit symbol 103C, HSG A), and the proposed elevations of the basin will result in the bottom being close to the underlying fine sand layer.

Recommendation: The lower exfiltration rate used in the HydroCAD model may not be representative of the actual soil conditions that will be encountered in the bottom of the infiltration basin. The applicant should consider the use of the infiltration rate value for loamy sands/HSG A soils (2.41 inches/hour) in the HydroCAD model, drawdown & mounding calculations. In addition, the applicant should consider modifying the infiltration basin section to call for the sandy loam in the bottom of the basin to be excavated to the fine sand layer, and permissive material (e.g. medium sand) used to replace same to the proposed subbase (i.e. below the 6" plantable soil layer) elevation.

The infiltration basin exfiltration rate used in the design was based on soil testing performed on site. Consideration was given to using a rate of 2.41 inches/hour; however, a more conservative rate of 1.02 inches/hour has been utilized to model long-term operating conditions within the proposed infiltration basin.

Plans

- 1) **General** – Schedule 40 PVC pipe is specified for use in the storm drainage system, particularly for elements of the stormwater BMP's.

Recommendation: The applicant should specify that all PVC pipe and fittings used for exterior/underground storm drainage infrastructure shall be gasketed, and further specify that glued connections shall not be allowed for any exterior/underground PVC pipes.

Notes have been added to detail 6 on Sheet C-7.5 to specify the use of gaskets for all PVC pipe for the use of exterior/underground storm drainage infrastructure.

- 2) **Sheet C-5.0 – Grading & Drainage Plan** – The plan calls for earthwork associated with the construction of the Infiltration to take place less than five (5) feet from the flagged bordering vegetated wetland (BVW), specifically between flags 22-23 and 25-26. It is unlikely that disturbance to the BVW itself will be avoided at that close proximity, considering the nature of the proposed work.

Recommendation: The applicant should consider modifications to the proposed infiltration basin design that would increase the clearance between the limit of the proposed work and the BVW to at least six (6) feet (allowing one (1) foot for soil erosion and sedimentation control (SESC) measures and five (5) feet of clearance between any earthwork and the SESC measures. Such modifications could include steepening the outside slope of the infiltration basin dike from 3:1 to 2:1, and installing permanent geosynthetic slope stabilization in same.

The proposed infiltration basin grading has been modified to provide a 2.5:1 outside slope. A minimum distance of six (6) feet from the proposed limit of work to the BVW has been provided.

Sheet C-7.4 – Construction Details Sheet 4 of 6 – Detail 1, Water Quality/Drawdown Device (Basin 1 & Inf. Basin) calls for the perforated PVC drawdown pipe to be wrapped in filter fabric. Our

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experience has been that filter fabric wrapping around perforated pipes tends to clog, significantly reducing the effectiveness of the drawdown pipe.

Recommendation: The applicant should eliminate the filter fabric and specify uniformly graded ¾” washed crushed stone, and during the construction process verify that the stone has been thoroughly washed, and is free of fine particulates and stone dust, prior to placement. In addition, the low-flow orifice end of the drawdown device should be configured so that the end plug or cap can be readily removed to allow for flushing of the pipe.

Detail 1 on Sheet C-7.4 has been revised to eliminate the filter fabric and specify ¾” washed crushed stone. Additionally, a removable cap on the end of the drawdown and low-flow device has been proposed for maintenance purposes.

- 3) **Sheet C-7.4 – Construction Details Sheet 4 of 6 – Detail 5, Low Flow Drain (Basin 2)** does not call for perforated SCH 40 PVC pipe, which would presumably be located in the crushed stone mound section.

Recommendation: The applicant should specify perforated SCH 40 PVC in the detail, and depict the connection to the solid SCH 40 PVC pipe with a gasketed SCH 40 PVC coupling. In addition, the low-flow orifice end of the low flow drain should be configured so that the end plug or cap can be readily removed to allow for flushing of the pipe.

Detail 5 on Sheet C-7.4 has been revised to specify perforated Sch. 40 PVC within the mound of crushed stone. Additionally, a gasketed coupling connection between the perforated and solid Sch. 40 PVC pipe has been depicted for clarity.

- 4) **Sheet C-7.4 – Construction Details Sheet 4 of 6 – Detail 8, Outlet Structure 2 (OS2) – Orifice/Grate** Detail depicts a single 2” diameter inlet orifice in the front elevation of the detail, while the elevation view in the detail calls for two (2) 3” diameter inlet orifices, as does the HydroCAD model.

Recommendation: The applicant should revise the front elevation of the detail to depict two (2) 3” diameter inlet orifices.

Detail 8 on Sheet C-7.4 has been revised to depict two (2) 3” diameter orifices as modeled in the HydroCAD calculations.

- 5) **Sheet C-7.5 – Construction Details Sheet 5 of 6 – Details 4 & 5 – Infiltration Basin Cross Sections** are mistitled, as only detail 4 is applicable to the infiltration basin.

Recommendation: The applicant should remove the word “Infiltration” from the title for each detail, and replace it with “Stormwater.”

The detail titles referencing “Infiltration” have been revised to specify “Stormwater”.

- 6) **Sheet C-7.5 – Construction Details Sheet 5 of 6 – Detail 5 – Basin Cross Section (Basin 2)** depicts the low flow drain, but does not depict the location and length of the perforated PVC pipe or the transition to solid PVC pipe (see comment 3 above).

Recommendation: The applicant should modify the detail to depict the perforated SCH 40 PVC pipe, as well as the coupling between it and the solid SCH 40 PVC pipe beneath the dike.

The basin cross section detail has been revised to specify the length of the low-flow device as well as showing the gasketed coupling connection between the perforated and solid Sch. 40 PVC pipe beneath the dike has been depicted for clarity.

We hope this serves your needs at this time. Should you have any questions or require additional information, please contact this office.

Very truly yours,
ANDREWS SURVEY & ENGINEERING, INC.



Travis R. Brown
Project Engineer

Enclosure(s)

C: BETA Group, Inc.
Zoning Board of Appeals
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