ENGINEERING SUCCESS **TOGETHER**

June 21, 2016

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

Re: Lakeland Farms
Chapter 40B Peer Review Scope & Fee

Dear Mr. Kulesza:

BETA Group, Inc. is pleased to provide this peer review for the proposed development at 84 Cleveland Street known as Lakeland Farms in Norfolk.

BASIS OF REVIEW

BETA received the following items:

- Lakeland Farms 40B Comprehensive Permit Application
- Lakeland Farms Site Plans prepared by Andrews Survey & Engineering, dated April 19, 2016
- Lakeland Farms Stormwater Management Report prepared by Andrews Survey & Engineering, dated April 19, 2016
- Lakeland Farms Operation & Maintenance Plan prepared by Andrews Survey & Engineering, dated April 19, 2016

Review by BETA will include the above items along with the following:

- Site Visit
- *Rules and Regulations for Subdivision of Land and Site Plan Approval of the Town of Norfolk,* Amended September 16, 2010
- *Town of Norfolk Zoning Bylaws,* with amendments May 2014
- *Wetlands Protection Act*
- *Rivers Protection Act*
- *Massachusetts DEP Stormwater Management Standards*
- Applicable federal and state regulations

The following are our comments related to the Civil Engineering and Stormwater management systems within the proposed development. Where referenced, the term "applicant" refers to either the applicant itself or its design consultants.

The plans submitted do not meet the Town of Norfolk Rules and Regulations in many respects. As such the applicant has provided a list of waivers for those sections which are not met. BETA has evaluated the waiver requests and finds that the list of waivers needed includes all known deviations from the Town regulations.

As a Chapter 40B proposal BETA has provided a review of the engineering of the site in reference to applicable State and Federal regulations and good engineering practice.

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.

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.

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.

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'.

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.

6. The construction detail for regulatory signs should note that all 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.

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.

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.

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.

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

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.

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.

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

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.

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.

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.

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.

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

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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 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.

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.

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.

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."

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.

If we can be of any further assistance regarding this matter, please contact us at our office.

Very truly yours,
BETA Group, Inc.

Andrew Ogilvie, PE
Senior Project Engineer