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April 17, 2015

Carlisle Zoning Board of Appeals
c/o Lisa Davis Lewis
Zoning Board of Appeals, Chair
66 Westford Street
Carlisle, MA 01741

RE: Nitsch Project #10399
Peer Review
Comprehensive Permit – 40B
100 Long Ridge Road
Carlisle, MA

Dear Ms. Lewis,

As requested by the Zoning Board of Appeals (ZBA), Nitsch Engineering has reviewed the new information submitted for the project known as the "The Birches" located at 100 Long Ridge Road in Carlisle, Massachusetts. This letter provides an update to the unresolved comments from our previous letters dated December 22, 2014 and March 13, 2015.

Nitsch Engineering has received and reviewed the following new plans and documents:

1. Plan set entitled, "Residential Site Plan Set, Affordable Housing Development, The Birches, Carlisle, Massachusetts," prepared by Meisner Brem Corporation, revised March 27, 2015 (11 sheets).

2. Letter from Meisner Brem Corporation to Carlisle ZBA, dated March 26, 2015, Re: "The Birches," 100 Long Ridge Road, application for Comprehensive Permit.

3. Letter from Meisner Brem Corporation to Carlisle ZBA, dated March 31, 2015, Re: "The Birches," Civil Engineering Response to Nitsch Letter of March 13, 2015.

4. Response to Chris Heep letter of March 13, 2015, prepared by JA Brem, dated March 13, 2015, entitled "Notes of items to be discussed with the Board of Appeals on March 26, as requested by Mr. Heep."

The Landscape Plans provided by the Applicant with this submittal were prepared by Gardner + Gerrish Landscape Architects and last revised on December 10, 2014. Although the date has not been updated on the plans, they have been revised since December 10, 2014 to include 16 trees for screening in three (3) locations around the property perimeter.

EXECUTIVE SUMMARY

The revised plans address many of our past comments; however, there are several unresolved issues regarding the hydrogeologic review, and the site and utility design that require further attention, as summarized in the list below. These issues are discussed in more detail in the subsequent sections of this letter.

- **Hydrogeologic Review - Proposed Wells and Wastewater Disposal**
  - Status of Applicant's hydrogeologic investigation and peer review by GeoHydroCycle, Inc.

- **Drainage**
  - Update diagram in Operation and Maintenance Plan to include all roof infiltration systems;
  - Install curbing for portions of roadway draining towards catch basin; and
  - Provide more detailed grading on site plans.

EXECUTIVE SUMMARY – continued

- **Erosion Control Plan**
  - Extend limit of perimeter erosion control barrier as previously recommended.
- **Project Phasing**
  - Adjust Phase I/II limit to allow adequate T – turnaround.
- **Fire Cistern**
  - Revise cistern calculation to use appropriate exposure factor; and
  - Proposed 30,000 gallon cistern may not be inadequate for proposed project density and related burn structure exposure, and it does not meet requirement of Carlisle Fire Chief.
- **Landscaping**
  - Assess adequacy of vegetative screening to abutters; and
  - Replace non-native species with native species.
- **Retaining Wall**
  - Include construction details for wall.
- **Requested Waivers – Updated Recommendations**

In addition to the discussion of these issues, this letter also includes a list of potential Conditions to assist the ZBA, should they choose to approve the proposed project.

HYDROGEOLOGIC REVIEW – PROPOSED WELLS AND WASTEWATER DISPOSAL

The Applicant is proposing to provide drinking water to the proposed development with 11 domestic water supply wells. The existing domestic water supply well will be converted to an irrigation well. The plans indicate that wastewater disposal will occur using three (3) proposed and one (1) existing onsite septic systems but it should be noted that two (2) of the systems are located directly adjacent to one another and may be viewed as one (1) system by the Carlisle Board of Health and Massachusetts Department of Environmental Protection (MassDEP).

The proposed septic systems must be permitted through the Board of Health (BOH); however, there is limited information regarding the design of the systems within the reviewed plan set and documents. The Applicant has stated that he intends to design the septic system after all other approvals but prior to application for a building permit. The design and potential impacts of the proposed septic continue to be a major discussion point, particularly with respect to the relationship between the wastewater disposal and drinking water supply wells.

GeoHydroCycle (GHC) is providing a focused review of the project's potential impacts to local groundwater quantity and quality. GHC submitted a letter to the ZBA on December 20, 2014 with comments and recommendations for hydrogeologic investigations to be conducted at Long Ridge Road to meet the requirements and regulations of the Town of Carlisle. These parameters were agreed upon by the Applicant. Northeast Geoscience, Inc. (NGI) was retained by the Applicant to estimate the potential groundwater impact analysis from the proposed wastewater discharges and issued their findings on March 25, 2015. As detailed in their letter dated April 13, 2015, GHC reviewed the NGI report and found that the hydrogeologic investigation did not meet many of their recommendations. The GHC letter details the inadequacies of the NGI study. Nitsch Engineering recommends that the Applicant provide additional analysis that aligns with the recommendations from the December 20, 2014 GHC letter so that the ZBA will have a full understanding of the potential groundwater impacts of the proposed project.

HYDROGEOLOGIC REVIEW – PROPOSED WELLS AND WASTEWATER DISPOSAL – continued

As requested by the ZBA, Nitsch Engineering investigated the Title V with respect to Nitrogen Loading Limitations. *Section 15.214: Nitrogen Loading Limitations* does allow for an increase in calculated allowable nutrient loading per acre with the use of an approved technology for enhanced nutrient removal. MassDEP further clarifies on their website that some Innovative/Alternative technologies are specifically designed to remove nitrogen from wastewater, and many of these systems seek a nitrogen removal credit, which allows the property owner to increase the design flow per acre, usually to either 550 or 660 gpd per acre from the standard 440 gpd per acre. Nitsch Engineering would like to clarify that use of these approved technologies does not allow the Applicants to discharge more nitrogen from the project site, only more wastewater with a lower concentration of nitrogen. The Applicant will need to provide documentation demonstrating compliance with the MassDEP requirements to use this credit.

DRAINAGE

In response to the Nitsch Engineering December 4, 2014 comment letter, the Applicant revised the Operation and Maintenance (O&M) Plan to include the proprietary catch basin inserts and to provide a diagram of the surface and subsurface BMPs. For the Final O&M Plan, we recommend highlighting the locations of the roof recharge systems in the diagram, similar to the other subsurface infiltration system located in the cul-de-sac. Nitsch Engineering also recommends that the O&M Plan stipulate that a qualified contractor is hired to perform the inspection and maintenance of the stormwater management system.

In response to Nitsch Engineering's March 31, 2015 comment letter, the Applicant revised the plans to provide a sloped granite curb for the first 100 feet of pavement edge (except in the location of the driveway for unit 1). Nitsch Engineering recommends that the Applicant include the installation of curbing to the portions of the roadway draining towards CB 60 and 62 and the cul-de-sac draining to CBs 54 and 56 on the Final Construction Documents to ensure all roadway drainage is captured and treated in the stormwater management system. For areas that will not be curbed, Nitsch Engineering recommends that the Applicant evaluate pavement edge treatments including flush curb or extended crushed stone to maintain stability of the pavement edge.

In response to the Nitsch Engineering March 31, 2015 comment letter, the plans were revised to provide additional cover over the driveway culverts and provide 1-foot contours for a portion of the site. Nitsch Engineering notes that the grading does not appear to match the inverts for the culverts, and recommends that the Final Construction documents include 1-foot contours and more detailed spot grades for the entire development.

FIRE CISTERN

In Attachment G-1 to the March 26, 2015 letter from Deschenes & Farrell, P.C., the Applicant provides the calculation used to justify a 30,000 gallon cistern for the proposed development. Nitsch Engineering reviewed this calculation and notes that the exposure factor of 1.5 appears to only cover one (1) exposure within 50 feet of a burn structure (housing unit). Given that 19 of the 20 units in the development are less than 50 feet from at least two (2) other houses, based on the calculations submitted the exposure factor should be increased to a minimum of 2.0.

This recommendation is consistent with the letter issued by the Carlisle Fire Chief on January 13, 2015, where he states:

"A 30,000 gallon cistern for fire protection is not acceptable for this development. In accordance with the National Fire Protection Association's Standards 1141 & 1142 the fire protection cistern needs to have a

FIRE CISTERN – continued

minimum of 45,000 gallons available for draft. If a fiberglass tank is used we note that the Benfield Farms 30,000 gallon fiberglass tank only allows drafting of 28,000 gallons. The requirement for the larger cistern is primarily due to at least one structure shown as being within 30 feet of another. This exposure increases the minimum volume of the cistern by a factor of 0.5."

Nitsch Engineering, in conjunction with the Carlisle Fire Chief, recommends that the Applicant provide a 45,000 gallon cistern to provide adequate protection for the proposed development density in accordance with the NFPA Standards.

PROJECT PHASING

The Applicant has stated that project will be constructed in two (2) phases. The limit of Phase I includes Units 1, 2, 3, 4, 5, 6, the existing house (Unit 20), and the private driveway up to approximately STA 4+00. Phase II includes the razing of the barn and construction of Units 7-19. Nitsch Engineering previously noted that the temporary "T" turnaround at the end of the roadway for Phase 1 development was not indicated on the plans. The revised plan set does not appear to address this comment and the limit between Phases I and II does not seem to allow for a dedicated turnaround. Nitsch Engineering recommends that the Final Construction Plans include this information on the phasing plan.

EROSION CONTROL PLAN

The revised Erosion Control Plan partially addresses our previous comments to extend the perimeter erosion control barrier (ECB), install inlet protection, and protect the rain gardens and swales from excessive compaction and sedimentation during construction. However, the ECB has not been extended to all areas in the site where the limit of work that is on a downslope towards a wetland or neighboring property, including behind Units 1, 10, 11, and 12. It is noted that there is an existing stone wall to be protected behind units 10, 11, and 12, so a super silt fence (or similar) may be more suitable to protect the wall from construction impacts.

SNOW STORAGE

The revised plans provide additional details on the snow storage areas for the proposed project. Based on the detail provided by the Applicant, there appears to be between three (3) and six (6) feet available for snow storage between the edge of the roadway and the high water line in the proposed swale. Additionally, the snow storage areas for infrequent large storm events are located outside of the 100-foot Buffer Zone to the wetland resource areas and away from the surface stormwater management features, including catch basins, rain gardens, and bioretention basins. Nitsch Engineering recommends that the Applicant include the proposed snow removal and storage plan with the Operation and Maintenance Plan in the Condominium Trust documents.

LANDSCAPING

A Landscape Plan was provided by a Registered Landscape Architect. The Plan provides for some street trees and shrub plantings along the roadway and within the cul-de-sac. The current Plan also provides for 16 8-foot tall Pinus strobus trees "to be installed at appropriate locations to provide screening." These screening trees are located behind Unit 1 (two [2] trees), Units 12 and 13 (six [6] trees), and Units 8 and 9 (eight [8] trees). Nitsch Engineering understands that the ZBA will be performing a site walk to review the proposed tree clearing and assess if the proposed screening is sufficient.

LANDSCAPING – continued

Nitsch Engineering also reviewed the Plant Schedule on the Landscape Plan, and for the Bioretention Basins and Rain Gardens, and notes that several of the proposed plant species do not appear to be native species to Massachusetts. Nitsch Engineering recommends that the Applicant's Landscape Architect review the planting schedule and replace non-native species with native species.

RETAINING WALL

The grading along the wetland line behind Units 14 and 15 indicates that a small retaining wall is required. The Applicant has clarified that this will be a 2-foot high retaining wall constructed with stones. Nitsch Engineering recommends that the Applicant provide design details for the wall on the Final Construction Plans.

WAIVERS

The Applicant has resubmitted their request for several waivers from the Carlisle Board of Health (BOH) Regulations and the Carlisle Water Supply Regulations. Nitsch Engineering offers the following comments on the technical waivers requested by the Applicant:

Board of Health Regulations

Section 15.211 – Minimum Setback Distance Between A System, 2,000 GPD/BR or Larger, To A Well

The Applicant is seeking a waiver from the well setback requirement of 150 feet to allow for a setback of 100 feet. Nitsch Engineering recommends that the Applicant provide an offset of 150 feet as required by the Carlisle BOH, unless they can provide evidence that the proposed septic systems will not impact any of the existing or proposed drinking water wells with a 100-foot offset. Nitsch Engineering defers to the comments provided by GHC and the BOH on the minimum allowable distance between the proposed septic systems and drinking water supply wells.

Section 15.221 General Construction Requirements for All System Components

The Applicant is seeking a waiver from the requirement of total gallons per day/bedroom (GPD/BR) to allow for design standard of 110 GPD/BR. Nitsch Engineering recommends that the Applicant adhere to the Carlisle BOH standard of 165 GPD/BR.

Section 15.290-293(5) Shared Systems, Condominium and Systems over 2000 GPD/BR

The Applicant is seeking a waiver from the required minimum design flow standard of 165 GPD/BR to allow for a design flow standard of 110 GPD/BR. Nitsch Engineering recommends that the Applicant adhere to the Carlisle BOH standard of 165 GPD/BR.

Section 15.100 General Provisions

The Applicant is seeking a waiver from the requirement that a proposed septic system design model "predict no rise in groundwater elevation and no greater than 5 mg/L of total nitrogen at the perimeter boundary." Nitsch Engineering recommends that the Applicant comply with the Carlisle BOH requirements and defers the GHC April 13, 2015 letter, which provides additional comments of the groundwater and nitrogen analysis provided by the Applicant.

Carlisle Water Supply Regulations – Section VI Location and Use Requirements

The Applicant is seeking a waiver from the requirement that a "well shall be located...150 feet from systems 2,000 GPD or greater." The waiver is sought to allow the well to be within 100 feet from a proposed septic system. As stated above, Nitsch Engineering recommends that the Applicant provide an offset of 150 feet unless they can provide sufficient evidence that the proposed septic systems will not impact any of the existing or proposed drinking water wells with a 100-foot offset. Nitsch Engineering defers to the comments provided by GHC and the BOH on the minimum allowable distance between the proposed septic systems and drinking water supply wells.

RECOMMENDED CONDITIONS

Based on this letter and previous reviews of the project, Nitsch Engineering recommends that the ZBA include the following Conditions if the project is approved. This should not be considered a comprehensive list of Conditions, as the ZBA is also preparing a list based on their review.

1. The Applicant shall provide the Condominium Trust document to the ZBA for review, including the final Snow Removal and Storage Plan, and the Operation and Maintenance Plans for the proposed private domestic wells, septic systems, irrigation system, fire protection cistern, and stormwater management system.

2. The Applicant shall update the ZBA on any status change for the potential vernal pool area following the determination by the Carlisle Conservation Commission. If it is determined that the area located within the wetland that receives stormwater from the project site is a vernal pool, then MassDEP Stormwater Management Standard 6 would become applicable to the project. Nitsch Engineering generally agrees that the stormwater BMPs proposed by the Applicant are consistent with those outlined by MassDEP for critical areas. The major design difference is that discharge to critical areas requires treatment of the first 1.0 inch of runoff, rather than 0.5 inches. Nitsch Engineering recommends that the Applicant proactively resolve this issue by demonstrating compliance with the 1.0-inch water quality requirement. However, if the Applicant does not want to demonstrate compliance with Standard 6 until the vernal pool question is resolved, Nitsch recommends that the ZBA include a condition, if approved, which revisits the issues after a determination has been made.

3. Project approval is dependent on obtaining all necessary approvals and permits from the Carlisle Conservation Commission.

4. The Applicant shall submit the Stormwater Pollution Prevention Plan (SWPPP) prepared in compliance with the NPDES Construction General Permit for review at least 60 days prior to construction.

5. Project approval is dependent on obtaining all necessary approvals and permits from the Carlisle BOH and MassDEP.

6. The Illicit Discharge Compliance Statement (prepared in compliance with Standard 10 of the MassDEP Stormwater Management Standards) shall be submitted to the ZBA for review at least 30 days prior to the start of construction.

7. The Applicant shall provide Final Construction Documents to the ZBA, which shall include the following:

RECOMMENDED CONDITIONS – continued

a. The location of the electrical and telecommunications conduit;
b. A detail including dimensions and a rendering that indicates the color, lighting, materials, and lettering of the proposed sign; and
c. Other recommendations noted within this letter.

8. The Applicant shall provide cut sheets of any proposed lights for the development that are in compliance with 'dark sky' practices on the Final Construction Documents.

We look forward to meeting with the ZBA at the hearing scheduled for Wednesday, April 22, 2015, to further discuss the project. Please contact us should you have any questions prior to the hearing.

Very truly yours,

Nitsch Engineering, Inc.

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