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December 22, 2014

RECEIVED
DEC 22 2014
TOWN CLERK-CARLISLE
CHARLENE M. HINTON

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,

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 for soundness of methodology, calculation, and conformity to standard engineering practice as requested. Nitsch Engineering's comments are intended to assist the Zoning Board of Appeals (ZBA) in understanding the proposed project, identify technical issues related to the site development, and to make recommendations to the ZBA of possible technical improvements to the proposed design.

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, dated November 14, 2014 (11 sheets – Sheet 12 was not provided).

2. Landscape Plans, prepared by Garder + Gerrish, LLC, revised December 10, 2014 (2 sheets).

3. Final Stormwater Management Report (Volumes 1 and 2), prepared by Meisner Brem Corporation, revised December 5, 2014.

4. Letter from Meisner Brem Corporation to Carlisle ZBA, dated December 8, 2014, Re: 100 Long Ridge Road, Civil Engineering Response to Nitsch Letter of 10-24-14.

5. E/ONE Pressure System Design Report for THE BIRCHES, 100 Long Ridge Road, Carlisle, MA, prepared by F.R. Mahoney & Associates, Inc., dated December 8, 2014.

6. Pressure Sewer Preliminary Cost and Design Analysis for THE BIRCHES, Carlisle, MA, prepared by Environmental One Corporation, dated December 8, 2014.

7. The Birches, Soil Testing, Brem 2012, 2014, submitted by Meisner Brem Corporation for peer review on December 16, 2014.

8. The Birches, Soil Testing, Berkes 1998, submitted by Meisner Brem Corporation for peer review on December 16, 2014.

The revised documents provided by the Applicant provide more detailed information than the previous plans. The design changes are summarized below:

- The proposed private driveway width increased to 24 feet in width from 20 feet.

- The maximum road grade was reduced from 8.0% to 6.0% and the roadway geometry was modified to eliminate the need for some of the waivers.

- The revised stormwater management system includes several Low Impact Development (LID) techniques:
  - Roof infiltration for each unit;
  - Roadside swales and rain gardens; and
  - A Bioretention Basin.

- The revised plan provides a 30,000 gallon water filled cistern. This cistern was reduced in size from 45,000 gallons in the previous submittal.

- The plan provides two additional wells for a total of 11 drinking water supply wells, which allows for no more than 2 units per well. The existing well that provides water to Unit 20 is proposed to change its use from a private domestic water supply to an irrigation well.

- The revised plans provide construction and specifications for the construction of the private driveway, the drainage system, the sewer lines within the private driveway, construction details, labels, critical dimensions, and other design information.

A review of the Applicant's Traffic Study and requested waivers with respect to traffic concerns was performed by Nitsch and outlined in a memorandum dated November 3, 2014. Based on the Applicant's response letter, it is anticipated that an addendum to the traffic study will be provided. Nitsch Engineering recommends that the Applicant provide a formal response to the comments issued in the November 3, 2014 letter. Upon receipt of the addendum and response to comments, Nitsch will review the new information and provide an updated letter to the ZBA on the traffic-related issues.

Nitsch Engineering notes that GeoHydroCycle (GHC) continues to review the project with respect to the proposed water supply wells and septic design. Based on ZBA hearings GHC and the Applicant have verbally agreed in principal to perform certain hydro-geo analysis, however, the Applicant has not provided a written document outlining proposed well testing methodology. Nitsch Engineering recommends that the Applicant provide the proposed well documentation to the ZBA for review.

Nitsch Engineering met with the Carlisle Police Chief, Fire Chief, Town Counsel, and Building Inspector on November 5, 2014 to review the proposed project and understand concerns related to public safety. Nitsch has reviewed and provided comments on the Applicant's response to the Fire Chief's comments from the meeting, which was dated November 14, 2014.

To maintain a record of the correspondence between the Applicant and Nitsch Engineering, the original Nitsch Engineering comments from October 24, 2014 are provided in normal type with the Applicant's response in *italic* font. Nitsch Engineering's current comments are in **bold** font.

SITE AND PROJECT DESCRIPTIONS

1. Summary of Existing Conditions

   The 9.84-acre project site is located at 100 Long Ridge Road and consists of one (1) lot. The site currently contains one (1) residential home and a horse farm. Approximately 4.5 acres of the site are cleared/developed and the remainder is woods or wetlands. An intermittent stream and associated Bordering Vegetated Wetland (BVW) cross through the eastern portion of the site. The BVW has been flagged and shown on the overall site plan. The project site is located east of the Blood Farm Trail, which is part of the extensive Carlisle trail system and leads to the Davis Corridor and Estabrook Woods.

   The topography in the developed portion of the site along the existing driveway and near the home and

barn is relatively flat. Moving eastward from the developed area, the topography slopes down, steeply in places, to the intermittent stream and associated BVW.

There is an existing private water supply well and septic system that service the existing residential home. Electric service is provided to the existing home by NStar through the underground wiring and the transformer located in the southwest corner of the site near Long Ridge Road. There is also underground cable service provided by Comcast.

Applicant Response: No response – peer review comment only on existing conditions.

Nitsch Response: No further response required.

2. Summary of Proposed Conditions

The Applicant is seeking a Comprehensive Permit from the Carlisle ZBA, pursuant to Massachusetts General Law Chapter 40B, to construct 19 new housing units on a 1,160± linear foot dead-end roadway. There will be 20 units in total, including the existing home that will remain, for a density of 2.03 units per acre. In General Residence District B, the Carlisle Zoning Bylaw requires a lot size of 2 acres with one (1) unit per lot (or density of 0.5 units per acre). The proposed 20-foot wide private roadway will be located approximately 110 feet east of the intersection of Long Ridge Road and Garnet Rock Lane. The roadway ends in a cul-de-sac that provides access for four (4) of the proposed units.

Domestic water service will be provided by eight new drinking water supply wells in addition to the existing well. Water supply for fire suppression will be provided by a 45,000-gallon fire cistern located in the southeast corner of the site on Long Ridge Road. The Applicant is proposing three (3) new "alternative technology" septic systems to provide sewage treatment for the new units. The Applicant proposes to manage stormwater generated by the proposed project through a combination of Low Impact Development (LID) techniques and conventional stormwater strategies.

Applicant Response: No response – peer review comment only on proposed conditions.

Nitsch Response: No further response required.

PERMITTING

3. The project does not appear to require review under the Massachusetts Environmental Policy Act (MEPA). Nitsch Engineering recommends that the Applicant confirm whether or not this certificate will be required.

Applicant Response: MEPA review is not required. None of the thresholds are exceeded.

Nitsch Response: This comment has been addressed.

4. Nitsch Engineering recommends that the Applicant verify with the Army Corps of Engineers that a Category one or two permit is not required for the proposed work within jurisdictional wetland resource areas. Also, Nitsch Engineering recommends that the Applicant verify with MassDEP whether a Water Quality Certificate is required for this project.

Applicant Response: A Water Quality Certificate is required in certain situations when wetland filling is proposed. No filling of a wetland is proposed so therefore a Water Quality Certificate is not required. The project complies with the ACOE General Permit for Massachusetts.

Nitsch Response: This comment has been addressed.

5. The Existing Conditions Plan indicates an intermittent stream and associated Bordering Vegetated Wetland in the eastern portion of the project site. The 100-foot Buffer Zone extends into the proposed development resulting in permanent impacts through the creation of impervious area. It appears that the proposed project will require grading immediately adjacent to the flagged BVW line (an offset of less than 5 feet in some areas) and may potentially result in disturbance within the BVW. Nitsch Engineering recommends that the Applicant confirm whether the proposed grading will impact the jurisdictional wetland resource areas and clearly indicate a limit of work on the plans.

   Applicant Response: The grading will not impinge on the wetland resource area. See Plans.

   Nitsch Response: The limit of grading has been shifted away from the wetland line on the revised plans. Nitsch Engineering recommends that the Applicant adjust the perimeter erosion control barrier to be further away from the wetland line and closer to the limit of grading wherever possible, and specifically behind units 13, 14, and 16.

6. The existing topographic contours in the eastern portion of the site are incomplete and, therefore, it is not possible to determine if the proposed grading will require work within the BVW. Nitsch Engineering recommends that the Applicant provide complete existing topographic information for the entire project site.

   Applicant Response: See Plans, Sheet 3.

   Nitsch Response: The existing topography was updated as requested. This comment has been addressed.

7. The Applicant should confirm if the area located east of the intermittent stream and BVW is to be designated as Open Space and if it will be under a Conservation Restriction.

   Applicant Response: Any open space provided will be owned by the Condominium Trust, Master Deed, and will not be under a Conservation Restriction.

   Nitsch Response: This comment has been addressed. Nitsch recommends that the Applicant provide the Condominium Trust document to the ZBA for review.

8. It does not appear that the project site is located within a Flood Zone or within protected areas designated by the Natural Heritage and Endangered Species Program (NHESP). The Applicant has indicated that a vernal pool may be located in a wetland in the southeastern portion of the project site. Nitsch Engineering recommends that the Applicant confirm the location of the vernal pool and provide it on the Existing Conditions Plan.

   Applicant Response: The reviewer confirmed that the project is not within a Flood Zone or areas designated by NHESP. The applicant concurs. The issue of the vernal pool is currently being discussed with the Conservation Commission for investigation in the Spring breeding season. The location is over 300 feet from any proposed activity. It is not a Certified Vernal Pool. It is not on the NHESP list for Potential Vernal Pools.

   Nitsch Response: Based on the response by the Applicant, the Conservation Commission and NHESP will make the final determination on the potential vernal pool in the spring. Nitsch Engineering recommends that the Applicant update the ZBA on any status change for the potential vernal pool area following the determination. Nitsch also recommends that the ZBA include a condition, if approved, that project approval is dependent on obtaining all necessary approvals and permits from the Conservation Commission.

9. The project includes the construction of eight (8) new drinking water supply wells to be shared by the proposed units. Nitsch Engineering understands that MassDEP will be making a determination on if the proposed wells will be classified public or private. If the wells are considered public, the Applicant will be required to permit the proposed water supply wells through the MassDEP permitting process; otherwise they will be permitted through the Carlisle BOH. Nitsch Engineering is working with GHC to review the proposed wells for feasibility and potential impacts to local groundwater quantity and quality.

   Applicant Response: The project increased the private domestic water supply wells from 9 to 11 with the existing well to be used as the irrigation well.

   Nitsch Response: GHC is involved in an on-going review process for the proposed wells and the potential impacts to local groundwater quantity and quality. Nitsch understands that MassDEP will be making a determination on whether the wells should be considered public or private. Nitsch Engineering and GHC have not received an updated hydrologic and geologic study for review at this time.

10. The Plans indicate three (3) proposed onsite septic systems that will be permitted through the BOH; however, there is limited information regarding the design of the systems within the reviewed plan set and documents. Nitsch Engineering recommends that the Applicant submit design calculations and site specific plans and details for the proposed septic systems to the ZBA, the BOH, and the Conservation Commission.

    Applicant Response: The applicant intends to design the septic system after all other approvals but prior to application for a building permit. The design will comply with Title 5. Additionally, the design will utilize one or more Innovative/Alternative Technologies. The reviewer should also see the previous letter sent by the applicant to the Board of Appeals on October 31, 2014.

    Nitsch Response: Nitsch Engineering has reviewed the letter submitted by the Applicant to the ZBA on October 31, 2014, as well as the E/ONE information submitted with their comment letter. Nitsch recommends that the ZBA include a condition, if approved, that project approval is dependent on obtaining all necessary approvals and permits from the BOH.

11. Nitsch Engineering recommends that the Applicant submit Operation and Maintenance (O&M) documents to the ZBA at the appropriate time that detail responsibilities for maintenance of the Public Water System, roadway, and septic systems. A separate O&M Plan for the proposed stormwater management system was submitted as part of the Stormwater Report (comments provided below). Nitsch Engineering recommends that the Applicant confirm if a Homeowners Association (HOA) will oversee and administer required on-going maintenance for the project and provide the HOA agreement to the ZBA for review.

    Applicant Response: The operation of the private domestic water wells will be consistent with every other water well within the Town of Carlisle. The ownership will be as outlined in the submitted materials as sub-Trusts of the overall Condominium Trust pursuant to the documents previously submitted by applicant's counsel and to be reviewed by the MassDEP after the all other permits are issued. The operation of the irrigation well and cistern will be by the Master Deed for the entire Condominium Trust. The operation and maintenance of the three septic systems will be by the Master Deed for the entire Condominium Trust and will follow Title 5 and the Innovative/Alternative Technologies requirements, as applicable. The operation and maintenance of the private driveway will be the responsibility of the Condominium Trust. The operation and maintenance of the drainage aspects will be by the Master Deed for the entire Condominium Trust and are also outlined in the Stormwater Report (Item L).

    Nitsch Response: Nitsch reviewed the Operation and Maintenance (O&M) Plan provided for the Stormwater Management System and recommends that the Applicant add information for the

proprietary catch basin inserts. Additionally, a diagram providing the location of all of the surface and subsurface BMPs should be included in the plan. The final Condominium Trust and O&M documents should be submitted to the ZBA for review.

12. Due to the fact that the project will disturb greater than 1 acre of land, Nitsch Engineering understands that an Environmental Protection Agency (EPA) and National Pollutant Discharge Elimination Systems (NPDES) permit will be required. In the Stormwater Report, the Owner indicates that this permit will be obtained prior to construction and that a Stormwater Pollution Prevention Plan (SWPPP) will be submitted to the ZBA and Conservation Commission. Nitsch Engineering recommends that the ZBA include a Condition to require that the Applicant submit the SWPPP for review at least 30 days prior to construction.

    Applicant Response: The project will comply with the NPDES program as monitored by the US EPA. The peer reviewer recommends such condition, which is acceptable.

    Nitsch Response: Nitsch maintains the recommendation that the ZBA include a Condition, if approved, that requires the Applicant submit the SWPPP for review at least 30 days prior to construction. No further response is required.

13. Nitsch Engineering recommends that the Applicant update the ZBA on the status of the above permits and any other required permits, including the interests of the Conservation Commission, Building Inspector, and BOH.

    Applicant Response:
    a. Conservation – the wetland line has now been determined with the advice and report of the Conservation Commission's peer reviewer, Dr. John Rockwood (see copy of report issued to the Board. No proposed wetland filling is confirmed. The project is presently on hold by agreement of the Conservation Commission awaiting ZBA action on the Comprehensive Permit.
    b. Building Inspector – awaiting Comprehensive Permit. Buildings will meet State Building Code and Stretch Code.
    c. Board of Health – the proposed septic systems will meet Title 5. The design is on hold awaiting ZBA action. The water supply wells are proposed to be private requiring MassDEP determination after the ZBA action.

    Nitsch Response: Nitsch recommends that the Applicant continue to update the ZBA on the other on-going permitting processes as these move forward.

PROJECT LAYOUT AND SITE FEATURES

14. The Applicant is proposing a 20-foot wide, 1,160± linear foot private roadway to provide access to the 20 units. The proposed cul-de-sac has an outer diameter of 120 feet and an inner diameter of 80 feet. Nitsch Engineering understands that the Applicant is preparing a traffic study that will be submitted as supplemental information. Upon receipt and review of the traffic study, Nitsch will provide additional comments on the roadway design, project density, and site circulation.

    Applicant Response: The project has been revised to provide 24 foot wide private driveway. The 120 foot outside diameter of the cul-de-sac with a 24 foot wide pavement conforms to the requests of the Carlisle Fire Dept. for their largest vehicle as documented in the Traffic Report by MDM.

    Nitsch Response: The Applicant has increased the width of the roadway to 24-feet while reducing the maximum slope from 8% to 6% and adjusting the geometry to meet Town requirements. Nitsch's remaining comments related to roadway design, project density, and site circulation are outlined in the Waiver discussion below. At this time, Nitsch has not received an updated Traffic Study or response to the comments issued; however, upon receipt,

we will review and provide an update to the initial traffic comments.

15. Due to the length and reduced width of the proposed roadway, Nitsch Engineering recommends that the Applicant provide turnouts every 300 feet in order to allow vehicles to pass.

Applicant Response: Turnouts are required within the Carlisle regulations for common driveways which have a reduced pavement width less than the 20 feet required for a town roadway. The Plans indicate a private driveway width of 24 feet to conform to the suggestions of the fire department. This is 4 feet wider than that required for a public roadway in the Carlisle Subdivision Regulations (20 feet wide pavement required). Thus, turnouts are not applicable and are not proposed.

Nitsch Response: Based on the meeting with the Police and Fire Chief, since the roadway width has been widened to 24 feet, there does not appear to be any concerns with the lack of turnouts along the proposed roadway. Nitsch notes that the revised plans do provide a turnout at the fire cistern, located east of the entrance on Long Ridge Road. This turnout was requested by the Fire Department and should remain part of the proposed project. This comment has been addressed.

16. Nitsch Engineering did not receive construction details as part of the plan set. Nitsch Engineering recommends that the Applicant submit detail sheets for the proposed site and roadway components, erosion and sedimentation controls, and utility infrastructure, including site specific details for the proposed septic systems, wells, and stormwater management system.

Applicant Response: Final design construction plans (Plans) are hereby provided including requested details.

Nitsch Response: Nitsch acknowledges that the revised plan set provides significantly more information than the previous plans.

17. Nitsch Engineering recommends the Applicant provide a typical cross section of the driveway that indicates curb type, shoulder width, sidewalk location and width, and proposed treatments at the shoulder slopes.

Applicant Response: Final design construction plans (Plans) are hereby provided including typical cross section and other private driveway details. A sidewalk is not proposed as there are none in the neighborhood or anywhere in the vicinity.

Nitsch Response: The cross section provided appears to conform with typical roadway sections in Carlisle. Nitsch notes that there is no curbing proposed, which is consistent with the Low Impact Development design techniques proposed (roadside swale and rain gardens). To provide stability and longevity for the pavement edge, Nitsch recommends that the Applicant evaluate pavement edge treatments including flush curb or extended crushed stone.

18. Nitsch Engineering recommends that the Applicant provide the locations of the easements for maintenance of the drainage and septic utilities and trail access on the plan set.

Applicant Response: No easements are proposed. All infrastructure improvements will be owned by the Condominium Trust.

Nitsch Response: This comment has been addressed.

19. The Applicant indicates that there will be a pedestrian path provided to connect the project site with the Blood Farm Trail. The Applicant also proposes to construct a trail and bridge over the intermittent stream and BVW located to the east of the proposed development. Nitsch Engineering recommends

that the Applicant confer with the Conservation Commission and Carlisle Trails Committee on the proposed trails and connections. In particular, the proposed wetland crossing will potentially require additional work within jurisdictional wetland resource areas.

Applicant Response: The trail to the wetland with bridge toward the south was removed from the project Plans. The trails committee has indicated no strong desire to include any trails in this land in their network. The walking path to the Blood Farm Trail exists and will be connected to the project driveway over the leaching area of the Septic Systems 2 and 3.

Nitsch Response: This comment has been addressed.

20. Nitsch Engineering recommends that the Applicant review the proposed project with the Fire Department. Specifically, the Applicant should confirm that there is sufficient access provided for emergency vehicles within the proposed roadway and cul-de-sac. Nitsch Engineering recommends that the Applicant provide turning movements at the entrance, along the proposed drive and around the cul-de-sac based on the largest Carlisle Fire Department vehicle.

Applicant Response: The applicant has met with the Fire Department. The largest vehicle can, in fact, maneuver the cul-de-sac, especially with the increase in pavement width to 24 feet. This was documented in the MDM Traffic Impact Assessment (Traffic Report) with 20 feet and will be part of an amendment to the MDM Traffic Report for the 24 feet. Further, the Traffic Report shows that the vehicle can make all turns with the removal of the previously proposed entrance island, which has been removed herewith as shown on the Plans.

Nitsch Response: Based on the information provided by the Applicant in the Traffic Report and the meeting with the Fire Chief on November 5, 2014, this comment has been addressed.

21. Nitsch Engineering recommends that the Applicant review the proposed project with the Police Department.

Applicant Response: The applicant met with the Police Chief on October 31, 2014.

Nitsch Response: As previously noted, Nitsch also met with the Police Chief on November 5, 2014. At the meeting, the Police Chief (and Fire Chief) indicated that his preference would be to provide a means of secondary access to Long Ridge Road via connection between Prospect Street and Nowell Farme Road. This would require clearing and widening of the existing path to allow emergency vehicles to travel through. The connection could be gated to limit access to emergency vehicles only. Nitsch Engineering recommends that the Applicant continue to evaluate the possibility of providing this secondary access route to Long Ridge Road and provide an update to the Board on the feasibility of this secondary route.

22. The Residential Site Plan for Comprehensive Permit indicates that the project will be constructed in two (2) phases. Nitsch Engineering recommends that the Applicant provide additional information on the proposed phasing, including the timeline for Phases 1 and 2 and the proposed phasing plan for the units, roadway, and utilities.

Applicant Response: Phasing: The project is phased for several reasons including construction mobilization, financing, construction processing, live-ability, but primarily to address the relocation of the existing horse contingent, which will take some time to organize once the commencement date of the project is determined. Specifically to address the comment, Phase I will be the initial phase of the project for Units 1, 2, 3, 4, 5, 6 and the existing house (unit 20). The private driveway will be constructed to approximately STA 4+00. This will provide a temporary "T" turnaround in the existing driveway as well as the barn area for construction parking and staging. Fortunately, the proposed private driveway slopes slightly from the high point at the end of Phase 1 to Long Ridge allowing for all

of the stormwater - including eight (8) rain gardens - for the first 400 feet (approximately) of private driveway to be installed to completion. Units 1 – 6 will utilize the septic system 1 with the piping directed to it as shown on the plans. The private wells for each specific unit will be installed prior to the issuance of a building permit to confirm water supply.

Phase II, including the razing of the barn and displacement of the horses, will be started during the final stages of Phase I. The private driveway and utilities will be completed as a single phase. The sewer and water systems will be completed prior to the issuance of a building permit for that specific unit.

An exhibit of the phasing limits is included in the Plans.

The overall construction period is dependent on the timing of final approvals (unknown), due to the seasons. The project is expected to be completed within two to three construction seasons.

Nitsch Response: Nitsch Engineering requests that the Applicant clarify the following questions with respect to the project phasing:

- **Based on the plans provided, it is unclear where the temporary "t" turnaround will be provided for the Phase 1 development.**
- **What is the proposed timing to convert the existing well servicing Unit 20 from domestic water supply to irrigation? It appears that the proposed well that will provide drinking water to Units 19 and 20 is within the Phase 1limit of work, however other associated work (irrigation tank, construction of Unit 19) is proposed for Phase 2.**

23. Signage within the site is not indicated on the plans. Will there be an entrance sign for the development? Nitsch Engineering recommends that the Applicant indicate locations and types of proposed signage on the plans.

Applicant Response: Signage location and size have been added to the plans.

Nitsch Response: The Applicant is proposing a 25-foot wide sign at the entrance to the project. Nitsch recommends that the Applicant provide a detail including dimensions and a rendering that indicates the color, lighting, materials, and lettering of the proposed sign for the ZBA to review. The "Stop Bar/Street Sign" detail indicates that there will be additional signage at the intersection of the proposed roadway and Long Ridge Road. Nitsch Engineering recommends that the location of signage and stop bar also be provided on the Site Layout Plan.

24. Snow storage areas are not designated for the proposed project. Nitsch Engineering recommends that the Applicant describe the locations and indicate the locations of snow storage areas on the plans. The snow storage areas should be located outside of the jurisdictional wetland resource areas and Buffer Zone and the stormwater management system, and should not interfere with emergency access to the project site. Additionally, they should be coordinated with the proposed landscape a plans.

Applicant Response: Snow storage areas have been designated on the revised plans. Two types are provided: a) for the everyday snow storm along the private driveway via plow blades as all other roads in New England, and b) snow storage for the occasional super storm where the banks need to be cut back or snow moved to allow for future snow. Both areas are shown on the Plans.

Nitsch Response: Snow storage areas are indicated on the revised Layout Plan. Currently, these areas are shown within the swale and rain garden areas proposed for stormwater collection and treatment. If snow is plowed to the edge of roadway without any breaks, there will be no way for street runoff/snow melt to flow into the stormwater system. Nitsch recommends that the snow storage areas be revised to be outside of the stormwater

management practices.

25. Does the Applicant anticipate ledge removal? Nitsch Engineering recommends the Applicant indicate whether ledge will be removed as part of this project. If ledge removal is anticipated, the Applicant should coordinate with the ZBA on the appropriate methods and times of removal.

Applicant Response: No ledge has ever been encountered in the area of proposed development. Any removal will comply with Carlisle noise and state regulations.

Nitsch Response: There is no ledge indicated on the Test Pit information provided by the Applicant. Nitsch concurs with the Applicant that if any ledge is encountered, removal shall comply with all applicable Carlisle and state regulations. This comment has been addressed.

26. Nitsch Engineering recommends that the Applicant submit a Landscaping Plan for the project site that includes the proposed plantings within the drainage swales and bioretention basin and the vegetative screening around the site perimeter and between units. Nitsch Engineering recommends the use of native plant materials in the project site.

Applicant Response: A Landscaping Plan signed by a Registered Landscape Architect was submitted on or about October 3, 2014. Native plants are proposed. The Landscape Plan (Sheet 12) will soon be updated to reflect the various proposed rain gardens and other features.

Nitsch Response: A Landscape Plan was provided by a Registered Landscape Architect. The Plan provides for some street trees and plantings along the roadway and within the cul-de-sac. There are no proposed plantings to provide vegetative screening for the adjacent neighbors. Nitsch recommends that the Applicant protect as many of the existing trees as possible around the perimeter of the site, and add additional trees/plantings where needed to provide screening, especially in the reduced setback areas.

27. Nitsch Engineering recommends that the Applicant submit a Lighting and Photometric Plan to provide the proposed light locations for the roadway and housing units and to indicate the amount of light that will project onto the ground and surrounding area from the unit and site lighting.

Applicant Response: No exterior lighting is proposed other than on the individual residential buildings.

Nitsch Response: Nitsch Engineering recommends that the Applicant provide cut sheets of any proposed lights for the development that are in compliance with 'dark sky' practices on the Final Construction Documents.

GRADING

28. In general, the proposed roadway and housing units will require minor cuts within the existing topography, with more substantial earthwork (both cuts and fills) in the easternmost portion of the site near the proposed cul-de-sac. Nitsch Engineering recommends the Applicant indicate the general cut and fill volumes for the proposed development and the net increase or decrease of fill being brought to the site.

Applicant Response: The site requires 1100 CY of net fill (raw). The site is basically balanced upon factoring swelling and the importation of select material required for the private driveway base and asphalt. The raw cut and fill volumes are as follows:

Cut: 7700 CY
Fill: 8800 CY

Nitsch Response: The revised grading along the wetland line behind Units 14 and 15 appears to indicate that a small retaining wall is required. Nitsch Engineering recommends that the Applicant review the grading in this area and confirm whether a wall will be required.

UTILITIES – GENERAL

29. Nitsch Engineering recommends that the Applicant provide rim and invert information for the proposed sewer and drainage utilities.

Applicant Response: Details of construction including rims, inverts, pipe type, pipe lengths, and pipe slopes are provided on the Plans. Several tables are provided.

Nitsch Response: Nitsch performed a preliminary review of the new utility design information and has the following comments:

a) **The bioretention basin detail does not provide the required subsurface treatment layers/depths outlined in the MassDEP Stormwater Handbook.**
b) **The riser provided in the bioretention basin for outlet control has very small holes (0.5 inch) that will be prone to clogging. A trash rack is recommended.**
c) **A riprap spillway detail is referenced but not provided for the sediment forebay overflow into the basin.**
d) **Nitsch recommends that the rain gardens have similar subsurface treatment layers as the bioretention basin. An underdrain is also recommended given the limited infiltrative capacity of the soil.**

30. The Applicant is proposing water lines, fire protection lines, electric service, and cable service within the project site. Nitsch Engineering recommends the Applicant indicate all utilities on the plan including size, pipe material type and length. Nitsch Engineering recommends the Applicant demonstrate that any drain, sewer, and water line crossings do not conflict and meet adequate vertical and horizontal separation.

Applicant Response: Details of all piping are shown on the Plans. Several tables are provided. There are no potential conflicts of the sewer and drain lines. The water (from the private wells) can be lowered to avoid any sewer or drain conflicts. The telephone, cable, and electric lines can also be located around the sewer and drain.

Nitsch Response: The revised plans show the locations of the sewer, drainage, domestic water supply, and irrigation utilities. There appears to be some missing or incomplete drainage information provided in the tables on Sheet 6, and some of the pipes appear to have insufficient cover. Nitsch recommends that the Applicant review the tables and revise as necessary.

There is a detail for the proposed underground power conduit, but the proposed location and connection to existing utilities are not shown. Nitsch recommends that the location of the conduit be added to the Final Construction Documents.

31. Nitsch Engineering recommends the Applicant provide the necessary details for the fire cistern tank. Nitsch Engineering notes that the Fire Department typically requires turnouts at the locations of fire cistern tanks.

Applicant Response: The proposed 30,000 gallon water filled fiberglass fire cistern is provided with standard details shown on the Plans.

Nitsch Response: The previous plans provided a 45,000 gallon cistern, which has since been reduced to 30,000 gallons. At the meeting on November 5, 2014, Fire Chief Flannery indicated

that a tank capacity of 40,000 gallons would support the number of proposed units and provide 10,000 gallons to cover exposure. The Applicant should confirm with the Fire Chief that a 30,000 gallon cistern would be acceptable and would sufficiently cover exposure for the proximity of the buildings. Nitsch notes that, although the buildings have been adjusted to provide a minimum 30-foot separation, there are several units where the porches are included within that dimension and may also be considered combustible structure. Further review and comment by the Fire Chief is recommended.

WATER AND SANITARY

32. Design calculations, construction details, test pit data, and a groundwater mounding analysis for the proposed septic systems were not submitted with the Application materials. Nitsch Engineering recommends this information be submitted to the BOH and ZBA for review, if it has not been submitted.

Applicant Response: The septic system will not be designed as part of the Board of Appeals application. The septic system will meet Title 5 and will be presented for approval to the Carlisle Board of Health prior to the application for building permit.

Nitsch Response: The Applicant provided information on the low pressure force main piping, terminal manhole, and check valve system located within the proposed roadway. The Applicant is waiting to submit septic design information for the BOH review. Nitsch recommends that the ZBA include a condition, if approved, that project approval is dependent on obtaining all necessary approvals and permits from the BOH.

33. Nitsch Engineering recommends that the Applicant provide the 100-foot radius around each proposed drinking water supply well on the plan set to confirm that there is at least 100 feet of separation between the wells and existing and proposed septic systems.

Applicant Response: The plans do not show the 100 foot radius around each well which would serve to unnecessarily messy up the plans. However, the wells will be over 100 feet from the septic systems and this will certainly be shown on the final septic plans.

Nitsch Response: Based on the revised plans, there appears to be at least 100 feet of separation between the septic systems and the proposed wells. This comment will be addressed pending the inclusion of the information on the final septic plans.

DRAINAGE/STORMWATER MANAGEMENT

To support the design of the stormwater management system, the Applicant used HydroCAD software to analyze the existing and proposed hydrologic conditions on the project site. Nitsch Engineering generally agrees with this methodology, however additional information is needed to confirm that the proposed design is appropriate for the site and technically feasible. There appears to be inconsistencies between the existing and proposed drainage maps and their respective HydroCAD models. Nitsch Engineering recommends that the Applicant review and revise the maps and HydroCAD models to be consistent and update the model based on the following comments:

34. The Applicant is proposing to implement Low Impact Development (LID) techniques for a portion of the site, including roadway draining to roadside swales and providing treatment and infiltration with a bioretention basin. Nitsch Engineering recommends that the Applicant evaluate additional opportunities to implement LID throughout the site, rather than using a traditional closed drainage system.

Applicant Response: The applicant has engaged LID principals and concepts on this project and has proposed a series of LID techniques. These include roof infiltrations systems, a series of vegetated

grass swales with ten (10) distinct rain gardens, a bio-retention area, an irrigation cistern to utilize the collected rain water for irrigation use, and an infiltration discharge system.

Nitsch Response: Nitsch Engineering acknowledges that the Applicant has revised the stormwater management system to include more LID techniques, including rain gardens, a bioretention basin, and infiltration chambers for the roof of each unit. This comment has been addressed.

35. Nitsch Engineering recommends that the Applicant provide the soil test pit logs for review.

Applicant Response: Soil test pit logs are submitted under separate cover.

Nitsch Response: The Applicant provided logs for soil test pits located in the southern portion of the project site and one test pit for the proposed infiltration system to be located in the cul-de-sac. Nitsch Engineering recommends that the Applicant provide sufficient additional testing to confirm the soil texture, groundwater elevation, and ledge conditions so that the Applicant can confidently make the determination that all proposed infiltration systems will have a minimum two (2) foot offset to groundwater.

36. There does not appear to be soil testing in areas of proposed stormwater infiltration. MassDEP requires testing to confirm the soil texture, groundwater elevation, and ledge conditions within the footprint of bioretention basin and subsurface infiltration system.

Applicant Response: Soil test pit logs are submitted under separate cover.

Nitsch Response: Refer to the comment provided under #35.

37. Based on the NRCS Soil Map, a hydrologic soil group (HSG) of "C" was used by the Applicant in the HydroCAD model for land cover types and for the recharge calculation. However, an infiltration rate of 8.27 inches per hour was used when modeling the basins in the HydroCAD model, which is the Rawl's Rate for sand (HSG "A"). Nitsch Engineering recommends that the Applicant provide additional soils information to support the design parameters for the proposed basins.

Applicant Response: The models were revised to use hydrologic soil group "C" throughout. The lowest allowable infiltration rate was revised to 0.17 inches / hour in the HydroCAD model for the infiltration trench. This is the most conservative approach.

Nitsch Response: The soil test pit information describes the soils at the surface to be sandy loam, which is consistent with the NRCS Soils Map. Because there has been no permeability testing performed within the proposed stormwater infiltration areas, Nitsch generally agrees with the approach to use a more conservative infiltration rate. This comment has been addressed.

38. The northern portion of the roadway drains towards the catch basins located within the cul-de-sac, a length of approximately 450 feet. Nitsch Engineering recommends that the Applicant provide additional structures within the roadway every 250-300 feet to reduce the volume of gutter flow.

Applicant Response: Additional catch basins are provided in the revised plans near STA 6+20.

Nitsch Response: This comment has been addressed.

39. Nitsch Engineering recommends that the Applicant provide closed drainage calculations for the stormwater management system.

Applicant Response: Final Stormwater calculations are provided with the revised plan set.

Nitsch Response: It appears that the Applicant is using the HydroCAD model as the methodology to design the closed drainage system. However, the HydroCAD model is reporting numerous warnings and messages that may indicate issues with the pipe sizing. Nitsch recommends that the Applicant review the model and reconcile these issues to the maximum extent possible to ensure that the reported peak flow rates are accurate.

MASSDEP STORMWATER MANAGEMENT STANDARDS

Standard 1: No new untreated storm water conveyances to wetland resources area.

This standard allows the direct discharge of stormwater to waters and wetlands provided the discharge is adequately treated to protect groundwater, surface waters and wetlands in accordance with the Massachusetts Stormwater Handbook. The southern portion of the proposed roadway is minimally treated using catch basins prior to discharging towards the BVW and does not meet the requirements of Standards 1 or 4 for water quality treatment. Based on the information provided, it does not appear that this Standard has been met.

Applicant Response: In Phase 1 the project runoff is treated by a series of grassed drainage swales and eight (8) distinct rain gardens, each of which will slow the runoff flow and will treat this flow by filtration, ionization, and biological uptake via the grasses and various specialty plantings.

In Phase 2 the project runoff from STA 4+96 to 6+20 is directed to deep sump catch basins then to a bio-retention facility which will slow, filter, and remove various pollutants. The remaining runoff is directed to two (2) rain gardens. The bio-retention area and rain gardens will treat the runoff flow by filtration, ionization, and biological uptake via the grasses and various specialty plantings. The runoff is directed to an irrigation cistern which will also act as a clarifier, letting solids settle to the bottom. Finally, most of the remaining runoff that is not retained for irrigation will be discharged to the ground via an underground infiltration system composed of 36 connected Cultec chambers with an overflow discharge to the wetland. This outlet is approximately 50 feet from the wetland resource area, thereby providing further treatment and opportunity for infiltration.

Nitsch Response: Nitsch acknowledges that the Applicant has revised the stormwater management system to include treatment trains that meet the requirements of the Standards 1 and 4. The exception to this is the southernmost portion of the roadway near the intersection with Long Ridge Road, which is minimally treated using catch basins prior to discharging towards the BVW and does not meet the requirements of Standards 1 or 4 for water quality treatment. Nitsch recommends that the Applicant provide additional treatment for this area, possibly through the use of the Stormwater Buffer Zone catch basin insert, which is being used elsewhere on the site. Nitsch also recommends that the Applicant confirm that the pretreatment provided for the irrigation cistern is sufficient for the system pump and other components to work effectively.

Standard 2: Storm water management systems must be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.

As previously noted, there appear to be inconsistencies between the existing and proposed drainage maps and their respective HydroCAD models, and the HydroCAD model should be updated revised on the in-situ soils information. Additional information is required to determine if Standard 2 is being met by the proposed design.

Applicant Response: The revised Stormwater Management Report clearly shows that there is no

increase in the peak discharge rate at the point of analysis, which is the southernmost point of discharge within the existing intermittent stream. The infiltration rate used was reduced by 30 X in this revision to 0.17 inches per hour, the slowest infiltration rate for HSG "C" soils. In summary, the post development peak flow rates are below the peak development peak flow rates for the 2 year, 10 year, 25 year, and 100 year storm frequencies.

Nitsch Response: Nitsch Engineering has reviewed the revised HydroCAD model that was used to determine the peak runoff rates for the existing and proposed conditions. Nitsch understands the intent of the Applicant to model all of the proposed stormwater basins, pipes, culverts, and structures; however, this appears to have caused numerous warnings and messages within the HydroCAD model that may indicate issues with the peak rate calculations. Additionally, the proposed model includes approximately 0.5 acres less area than the existing model, when these areas should be equal. Nitsch recommends that the Applicant review the model and reconcile these issues to the maximum extent possible to ensure that the reported peak flow rates are accurate.

Standard 3: Annual recharge to groundwater.

As previously noted, additional soil test pit information is needed to verify the soil texture, infiltrative capacity, and groundwater conditions within the proposed infiltration Best Management Practices (BMP). Therefore, additional information is needed to determine if Standard 3 is being met by the proposed design.

Nitsch Engineering recommends that the Applicant explore other alternatives for infiltration throughout the project site, including the use of dry wells for infiltration of roof runoff.

Applicant Response: The project was redesigned to use roof infiltration systems for every new dwelling (19) as shown on the plans. Additionally, the infiltration trench for Phase II will serve to aid in infiltrating the runoff into the ground.

Following the guidelines established by MassDEP, the project requires 1854 ft³ of annual infiltration prior to any LID credit. The LID credit is 53% reducing the required annual recharge to 871 ft³. Using just the proposed roof infiltration systems (not the infiltration trench for Phase II), the project proposes an annual recharge of 2689 ft³, which is more than 3 times what is required.

Nitsch Response: Nitsch generally agrees that the revised stormwater approach will provide stormwater recharge throughout the project site through the use of the proposed infiltration chambers, roadside swales, rain gardens, and bioretention basin. Nitsch notes that the Applicant did not provide testing to determine the infiltrative capacity within the proposed infiltration BMPs; however, the infiltration rate used in the calculations was conservative. This comment has been addressed.

Standard 4: For new development, storm water management systems must be designed to remove 80% of the average annual load (post-development conditions) of Total Suspended Solids (TSS).

The proposed stormwater treatment in the northern and southern portions of the proposed roadway does not appear to meet the pretreatment or treatment requirements of Standard 4. Nitsch Engineering notes that the Town requires 80% TSS removal prior to discharge to an infiltration practice and recommends that the Applicant complies with this requirement to maintain the longevity of the drainage system.

Nitsch Engineering also recommends that the Applicant confirm whether the project is subject to a 0.5-inch or 1.0 inch water quality volume related to discharge to critical areas (vernal pools within the receiving wetland) or infiltration within highly permeable soils (permeability rate of 2.41 inches per hour or greater). At this time, it does not appear that this Standard has been met.

Applicant Response: The Stormwater Management System for Phase I in the southern portion of the project proposes eight (8) distinct rain gardens to cleanse the runoff and remove TSS. The rain gardens provide 90% TSS removal. In Phase II, a combination of rain gardens (2) and bio-retention areas will be utilized to achieve at least a 90% removal. Additionally, the pretreatment proposed is the "Stormwater Buffer Zone" proprietary catch basin system which provides for a 62.6% TSS removal rate per MassDEP STEP, then into an 8,000 gallon irrigation cistern providing for additional clarification and settling prior to discharge to the proposed infiltration system consisting of 36 Cultec 330 units.

Nitsch Response: As noted in the response to Standard 1, Nitsch acknowledges that the Applicant has revised the stormwater management system to include treatment trains that meet the requirements of the Standards 1 and 4. The exception to this is the southernmost portion of the roadway near the intersection with Long Ridge Road, which is minimally treated using catch basins prior to discharging towards the BVW and does not meet the requirements of Standard 4 for water quality treatment. Nitsch recommends that the Applicant provide additional treatment for this area, possibly through the use of the Stormwater Buffer Zone catch basin insert, which is being used elsewhere on the site.

Standard 5: Storm water discharges from areas with higher potential pollutant loads require the use of specific storm water management BMPs. The use of infiltration practices without pretreatment is prohibited.

Not applicable.

Standard 6: Storm water discharges to critical areas must utilize certain storm water management BMPs approved for critical areas.

The Applicant should confirm that there are no resources identified as critical areas by MassDEP (i.e., vernal pools, wellhead protection areas, etc.) associated with the wetland resource area receiving the project's stormwater.

Applicant Response: No resources are identified as critical areas. The area is not within an Area of Critical Concern or an Outstanding Resource Water. The potential vernal pool is not a Certified Vernal Pool nor a Potential Vernal Pool on the Mass GIS and, at this point, it is not even determined if it is a vernal pool.

Nitsch Response: If it is determined that the area located within the wetland that receives stormwater from the project site is a vernal pool, then Standard 6 would become applicable to the project. Nitsch 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. If the Applicant does not want to provide compliance with Standard 6 until the vernal pool question is resolved, Nitsch recommends that the ZBA include a condition, if approved, that revisits the issues after a determination has been made.

Standard 7: Redevelopment of previously developed sites

Not applicable.

Standard 8: Erosion and sediment controls must be implemented to prevent impacts during construction or land disturbance activities.

Minimal erosion controls are provided on the plans. The Applicant does not show adequate perimeter erosion controls, inlet protection, stabilized construction entrances, or the details associated with these practices. Nitsch Engineering recommends the erosion control be shown on the plan and coordinated with the Conservation Commission Agent prior to construction. The Applicant indicated a Stormwater Pollution Prevention Plan (SWPPP) will be submitted prior to construction. Based on the information provided, it does not appear that this Standard has been met.

Applicant Response: An Erosion Control Plan with Details and Specifications is now included in the revised Residential Site Plan set. A Stormwater Pollution Prevention Plan (SWPPP) will be prepared as part of the US EPA NPDES permit prior to construction. This is typical since the contractor (operator) has yet to be determined. A condition to this effect would be acceptable.

Nitsch Response: The Erosion Control Plan provides the locations of the perimeter erosion control barrier (ECB) and temporary sediment basins and swales. Nitsch recommends that the ECB be extended around the entire site limit of work that is on a downslope towards a wetland or neighboring property, including the entire eastern edge of the limit of work. Nitsch recommends that the Applicant provide inlet protections on proposed catch basins, drop inlets, and culverts. The temporary swale is located within several proposed rain gardens that will be used for infiltration. Nitsch recommends that the Applicant include a note on the Erosion Control Plan that requires the Contractor to excavate and remove all sediment from the rain gardens prior to final construction of the subsurface layers. Sedimentation and excessive compaction must be avoided for the LID system to function adequately.

Standard 9: All storm water management systems must have an Operations and Maintenance Plan to ensure that systems function as designed.

A schedule for the operation and maintenance of the proposed stormwater management system was included in the Stormwater Report. While Nitsch Engineering does not take exception to the submitted material, there may be additional changes to the O&M Plan based on previous comments. This Standard has not been met.

Applicant Response: The Operation and Maintenance for the stormwater is included in the Stormwater Report and has been updated to reflect the additional controls.

Nitsch Response: Nitsch reviewed the Operation and Maintenance (O&M) Plan provided for the Stormwater Management System and recommends that the Applicant add information for the proprietary catch basin inserts. Additionally, a diagram providing the location of all of the surface and subsurface BMPs should be included in the plan.

Standard 10: Prohibition of Illicit Discharges

The Stormwater Report provided by the Applicant indicates that an Illicit Discharge Statement will be provided prior to construction. Nitsch Engineering recommends that the ZBA include a Condition to require the submittal of the Illicit Discharge Compliance Statement for review at least 30 days prior to the start of construction.

Applicant Response: The proposed condition by the peer review is acceptable to the applicant.

Nitsch Response: Nitsch Engineering recommends that this statement be included as a Condition, if approved.

WAIVERS

Nitsch Engineering offers the following comments on the technical waivers requested by the Applicant:

Zoning Bylaw

1. The Applicant is seeking a waiver to allow development of 20-unit housing development on a single lot in the Residence District B. Nitsch Engineering notes that the resulting density is 2.03 units per acre. The plan indicates that the proposed units are separated by a minimum of 25 feet. Nitsch Engineering understands that the Building Inspector and Fire Department will review the proposed project and may provide additional comments on the project density and spacing between units.

   Applicant Response: The buildings were revised to provide 30 feet separation – wall to wall, at the request of the fire department. Otherwise, the comment refers to the Building Inspector and Fire Department.

   Nitsch Response: Nitsch notes that, although the buildings have been adjusted to provide a minimum 30-foot separation, there are several units where the porches are included within that dimension and may also be considered combustible structure. Further review and comment by the Fire Chief is recommended.

2. The Applicant is seeking a waiver to allow for reduced setback from street of 33 feet (40 feet required). Nitsch Engineering notes that this waiver appears to reference the offset of Unit 1 from Long Ridge Road. The plan provided by the Applicant provides 20-30 feet between the proposed units and the proposed roadway. Nitsch Engineering recommends that the Applicant provide a Landscaping Plan to the ZBA that includes vegetative screening in the reduced setback area if the waiver is approved by the ZBA.

   Applicant Response: The plans have been revised to comply with the front yard setback for all units. Unit 1 is the closest and was moved to provide 40 feet.

   Nitsch Response: No further response required – Applicant has withdrawn waiver request.

3. The Applicant is seeking a waiver to allow for reduced front, side, and rear setbacks (proposed: 33 feet front, 10 feet side, 10 feet rear, required: 40 feet). Given the proximity of the homes on abutting lots to the east and west of the project site, Nitsch Engineering recommends that the Applicant provide the required side setback of 40 feet from the property line or provide a Landscape Plan that addresses screening based on the reduced setback. Nitsch Engineering recommends that the Applicant coordinate any screening methods with abutters and the ZBA.

   Applicant Response: The side and rear setbacks waiver request is still valid. A landscape plan and existing tree cover map was provided. The closest dwellings to the rear are 280 feet. The applicant is attempting to contact the owner of the dwelling at 132 Long Ridge Road (resides in Florida) to discuss screening directly with the owner and may amend the Landscaping Plan in this area but it is noted that this area has existing natural white pines offering an existing buffer along the property line near this dwelling.

   Nitsch Response: The Landscaping Plan, as revised on November14, 2014, does not provide any plantings behind the units that would provide additional screening in the reduced setback area. Therefore, the Applicant has not addressed the concerns in the initial comment. Based on comments received at the November 5, 2014 meeting, the Applicant should also confirm with the Fire Chief that adequate separation is being provided between the back of the units/decks and the existing tree line.

4. The Applicant is seeking a waiver to allow for twenty units on a Private Driveway as shown on the plan. Section 5.4.4 allows for a maximum of six (6) "lots" to share a Private Driveways. Although the project proposes the use of a Private Driveway which will only service one "Lot" in the event the Board interprets the bylaw to apply to "units" the Applicant is seeking a waiver to allow for use of the Private Driveway to serve 20 units. Nitsch Engineering understands that a traffic study is being performed by the Applicant and will be submitted as supplemental information. Upon receipt of the traffic study, Nitsch Engineering will provide additional comments related to the proposed roadway. Additionally, Nitsch Engineering recommends that the Applicant review the project with the Police and Fire Departments for issues related to public safety and site access for emergency vehicles.

   Applicant Response: The waiver is still valid but the width of the private driveway is changed with this revision to provide 24 feet of pavement to serve 20 units, which is 4 feet larger than the required public roadway in Carlisle per the Subdivision Regulations. The traffic study has since been received and other comments on this waiver were noted in the traffic review.

   Nitsch Response: Nitsch requests that the Applicant provide the updated traffic study for review. Upon receipt, additional comments will be provided. The Applicant has revised the roadway based on comments provided by fire and police, and the 24-foot width meets the Town of Carlisle requirements. However, Nitsch notes that although the buildings have been adjusted to provide a minimum 30-foot separation, there are several units where the porches are included within that dimension and may also be considered combustible structure. Further review and comment by the Fire Chief is recommended. Nitsch defers to the ZBA on whether twenty units are appropriate for the proposed roadway.

Subdivision Rules and Regulations

5. The Applicant is seeking a waiver from providing a landscape plan prepared by a registered landscape architect with the Comprehensive Permit Application. Nitsch Engineering recommends that the Applicant submit a Landscape Plan for the project site that includes the proposed plantings within the drainage swales and bioretention basin and the vegetative screening around the site perimeter including between units. Nitsch Engineering recommends the use of native plant materials in the project site.

   Applicant Response: A Landscape Plan, signed by a Registered Landscape Architect, was submitted on October 3, 2014. This waiver request will be withdrawn. The Landscape Plan will be updated shortly.

   Nitsch Response: No further response required – Applicant has withdrawn waiver request.

6. The Applicant is seeking a waiver from the requirements that a subdivision containing more than 11 "lots" having legal frontage on a single dead-end street is required to have no less than two (2) noncontiguous accesses with existing Town Roads. Nitsch Engineering recommends that the Applicant demonstrate how the proposed project will satisfy any life safety concerns from the Police and Fire Departments. Nitsch Engineering recommends that the Applicant explain whether the project can be re-designed to provide additional access points within the project.

   Applicant Response: The Police and Fire Departments have reviewed the plans. Additionally, I met with both the Police Chief and the Deputy Fire Chief. Further, a meeting was held with the Police Chief, Fire Chief, Building Inspector, and the peer reviewers, Nitsch Engineering. The applicant and/or his engineer was not invited to participate. The letter from the Fire Chief did not indicate a concern with this project in relation to the Subdivision regulation of more than 10 lots on a cul-de-sac private driveway with no less than 2 noncontiguous accesses with existing town roads other than requesting

that the width be 24 feet. Lastly, the project is proposed as a condominium on one lot and, therefore, this regulation may not be specifically applicable.

Nitsch Response: At the November 5, 2014 meeting, the Police Chief (and Fire Chief) indicated that his preference would be to provide a means of secondary access to Long Ridge Road via connection between Prospect Street and Nowell Farme Road. Nitsch Engineering recommends that the Applicant continue to evaluate the possibility of providing this secondary access route to Long Ridge Road and provide an update to the Board on the feasibility of this secondary route. Nitsch defers to the ZBA on the question raised by the Applicant on if units are lots and if this regulation is applicable to the project.

7. The Applicant is seeking a waiver from the requirements that a subdivision roadway "shall be laid out such that the closure of any single road will deny access to no more than ten (10) building lots." Nitsch Engineering recommends that the Applicant demonstrate to the ZBA whether it is feasible to layout a roadway to achieve the regulation. Nitsch Engineering will provide additional comments on this waiver once the traffic study is submitted and reviewed. Nitsch Engineering also recommends that the Applicant satisfy any life safety concerns with the Carlisle Police and Fire Departments.

   Applicant Response: This waiver request is similar if not identical to that of 6 above and therefore the response is repeated here. See 6 above.

   Nitsch Response: At the November 5, 2014 meeting, the Police Chief (and Fire Chief) indicated that his preference would be to provide a means of secondary access to Long Ridge Road via connection between Prospect Street and Nowell Farme Road. Nitsch Engineering recommends that the Applicant continue to evaluate the possibility of providing this secondary access route to Long Ridge Road and provide an update to the Board on the feasibility of this secondary route. Nitsch defers to the ZBA on the question raised by the Applicant on if units are lots and if this regulation is applicable to the project.

8. The Applicant is seeking a waiver from minimum centerline offset requirement of 125 feet. It is proposed to provide an offset of 75 feet. Nitsch Engineering recommends that the Applicant explain to the ZBA why this offset cannot be achieved. Nitsch Engineering understands that a traffic study is being prepared by the Applicant and will be submitted as supplemental information. Upon receipt of the traffic study, Nitsch Engineering will provide additional comments related to the proposed roadway and this waiver.

   Applicant Response: The traffic study confirms that the private driveway offset to Garnet Road at 110 feet is acceptable and within the requirements of AASHTO.

   Nitsch Response: Nitsch generally agrees that the offset is within the requirements of AASHTO, but will provide additional comments once the final traffic study is submitted for review.

9. The Applicant is seeking a waiver from meeting minimum centerline radius as shown on "Exhibit E" of the Subdivision Rules and Regulations. Please note Exhibit E shows a minimum radius requirement of 125 feet. It is proposed to provide a radius of 80 feet. Nitsch Engineering recommends that the Applicant provide turning movements to confirm that fire apparatus will be able to access the proposed roadway especially during the winter when snow may be placed along the side of the roadway and may narrow the effective roadway width. Nitsch Engineering recommends that the Applicant explain to the ZBA why the 125-foot minimum radius is not achievable. Nitsch Engineering will provide additional comments to the ZBA on this waiver after review of the Applicant's traffic report.

   Applicant Response: The traffic study provided turning movements for the largest fire apparatus of the Carlisle Fire Department showing that the turning radius will accommodate the apparatus with a 20 foot

wide private driveway. Additionally, the pavement width is now increased to 24 feet which would make the turning movements easier and will also serve to address snow storage. The Subdivision requirement of 125 feet would traverse through units 17, 18, 19 eliminating no less than 2 units with any re-design scheme.

Nitsch Response: Nitsch generally agrees that the revised roadway improves access and circulation within the project but respectfully requests an updated turning template to document that the revised roadway layout/geometry is accessible for the largest Carlisle fire apparatus. This revision should be reviewed by fire department for determination of life safety issues. If there are no additional concerns from the fire department, Nitsch recommends granting the requested waiver.

10. The Applicant is seeking a waiver from meeting maximum street grade as shown on "Exhibit E" of the Subdivision Rules and Regulations. Please note Exhibit E, footnote B, shows a maximum street grade of 6% when the centerline street radius is less than 200 feet. (Also note that the project's proposed centerline street radius is 80 feet.) It is proposed to provide a maximum street grade of 8%. Nitsch Engineering recommends that the Applicant provide a street centerline grade of 6% and explain to the ZBA if there are any impacts to providing the street centerline at 6%.

    Applicant Response: The waiver request for street grade of 8% through a curve of less than 200 feet will be withdrawn. The maximum grade is reduced to 6%, which complies with the regulation.

    Nitsch Response: No further response required – Applicant no longer seeking waiver.

11. The Applicant is seeking a waiver from meeting Sag Vertical Curve requirement as shown on "Exhibit E" of the Subdivision Rules and Regulations. Please note Exhibit E shows a Sag Vertical Curve requirement of K=24. The Applicant proposes to provide a Sag Vertical Curve of K=15. Nitsch Engineering recommends that the Applicant revise the plans to include a Vertical Sag Curve with a K of 24.and explain to the ZBA why the minimum Sag Vertical Curve cannot be achieved.

    Applicant Response: The waiver request for the Sag Vertical Curve will be withdrawn.

    Nitsch Response: No further response required – Applicant no longer seeking waiver.

12. The Applicant is seeking a waiver from Subdivision Dead-End Street Requirement that "no Dead-End Street shall provide legal frontage for more than 10 building lots." Nitsch Engineering understands that a traffic study is being performed by the Applicant and will be submitted as supplemental information. Upon receipt of the traffic study, Nitsch Engineering will provide additional comments related to the proposed roadway. Additionally, Nitsch Engineering recommends that the Applicant review the project with the Police and Fire Departments for issues related to public safety and site access for emergency vehicles.

    Applicant Response: The waiver request for a dead end street to provide legal frontage is still active and is similar to the waiver identified above in number 6. See response to 6 above.

    Nitsch Response: At the November 5, 2014 meeting, the Police Chief (and Fire Chief) indicated that his preference would be to provide a means of secondary access to Long Ridge Road via connection between Prospect Street and Nowell Farme Road. Nitsch Engineering recommends that the Applicant continue to evaluate the possibility of providing this secondary access route to Long Ridge Road and provide an update to the Board on the feasibility of this secondary route. Nitsch defers to the ZBA on the question raised by the Applicant on if units are lots and if this regulation is applicable to the project.

13. The Applicant is seeking a waiver from Subdivision Dead-end Street geometry requirements for the cul-de-sac turnaround of: 140-foot outside diameter of the paved surface and a 100-foot diameter center island. The proposed geometry is as follows: 120-foot outside diameter of the paved surface and an 80-foot diameter center island. Nitsch Engineering recommends that the Applicant provide turning movements to confirm that fire apparatus will be able to access the proposed roadway. Nitsch Engineering understands that a traffic study is being performed by the Applicant and will be submitted as supplemental information. Upon receipt of the traffic study, Nitsch Engineering will provide additional comments related to the proposed roadway. Additionally, Nitsch Engineering recommends that the Applicant review the project with the Police and Fire Departments for issues related to public safety and site access for emergency vehicles.

    Applicant Response: The geometry of the cul-de-sac conforms to the requests of the Fire Chief in his memos to the Board. Further, the traffic study shows that the turning movement for the largest apparatus is acceptable at a roadway width of 20 feet. As noted, a pavement width of 24 feet is now proposed in keeping with the request of the fire chief.

    Nitsch Response: In the November 5, 2014 meeting, Fire Chief expressed a preference for a cul-de-sac with a tear drop shape. Again, Nitsch respectfully requests an updated turning template to document that the revised roadway layout/geometry is accessible for the largest Carlisle fire apparatus. This revision should be reviewed by fire department for determination of life safety issues. If there are no additional concerns from the fire department, Nitsch recommends granting the requested waiver.

14. The Applicant is seeking a waiver from Subdivision Dead-end Requirement that "no more than three (3) lots can be accessed on a cul-de-sac." The project proposes four (4) units to access on the cul-de-sac. Nitsch Engineering recommends that the Applicant explain to the ZBA whether this layout will satisfy any life safety concerns including any concerns from the Police and Fire Departments.

    Applicant Response: The waiver request for access to four (4) units on the cul-de-sac is still valid. As a civil engineer I do not understand the rationale of this requirement so it is difficult for me to respond and provide rationale. This requirement is not reiterated in any engineering regulations, guidelines, or standards of which I am aware. The Fire Chief did not indicate any issues with this layout.

    Nitsch Response: There were no specific issues raised by the Fire Chief with respect to the number of units on the cul-de-sac. Howver, Nitsch notes that there may be some concern with the spacing of the units, because as previously mentioned, there is less than 30 feet between some of the porches. This may warrant additional review by the Fire Chief. If acceptable to the Chief, Nitsch defers to the ZBA for the determination on if four (4) units are acceptable on the cul-de-sac.

15. The Applicant is seeking a waiver from the requirement of sloped/vertical granite curbing on subdivision roadways. The project proposes to use Cape Cod Berm on the Private Driveway. Nitsch Engineering does not recommend granting the waiver and notes that granite curbing is more durable than Cape Cod Berm.

    Applicant Response: The waiver request is hereby amended to no curbing so that the Low Impact Development stormwater design can be utilized with grass swales and rain gardens. Actually, the Subdivision Regulations allow for no curbing when LID practices are employed, as is here, so again, a waiver, per se, may not be required.

    Nitsch Response: There is no curbing proposed, which is consistent with the Low Impact Development design techniques proposed (roadside swale and rain gardens). Nitsch does not have an issue with the requested waiver; however, to provide stability and longevity for the

pavement edge, it is recommended that the Applicant evaluate pavement edge treatments including flush curb or extended crushed stone.

16. The Applicant is seeking a waiver from requirement that "Infiltration of runoff from impervious surfaces (other than roof runoff) shall only be allowed where pretreatment of runoff for sediment removal of eighty percent TSS (total suspended solids) is provided." Nitsch Engineering notes that the Town of Carlisle requires 80% total suspended solids (TSS) removal prior to discharging to an infiltration practice and recommends that the Applicant comply with this requirement to maintain the longevity of the drainage system.

Applicant Response: The Mass DEP requirement for pretreatment prior to infiltration is 44%. Carlisle requires 80% pretreatment. My opinion is that this is onerous, is relatively not of any significant benefit, and is often impossible. The waiver request for 80% TSS pretreatment prior to infiltration is still valid but it should be noted that the design incorporates a proprietary inlet to achieve 62.6% with the use of the Stormwater Buffer Zone as the catch basin for three inlets.

Nitsch Response: Nitsch acknowledges that the Applicant has proposed a treatment train that includes a proprietary inlet, cistern, and subsurface infiltration system, which almost achieves the required 80% pretreatment requirements and meets the intent of the requirement. Nitsch supports granting the waiver request.

Carlisle Non-Zoning Wetland Bylaw

17. The Applicant is seeking a waiver from the local Conservation Commission filing fees. Nitsch Engineering recommends that the ZBA follow the recommendations presented by Conservation Commission.

Applicant Response: The request for the waiver of local fees for Conservation Commission is still valid. The applicant has paid over $7700 for the full cost of the application and peer review.

Nitsch Response: Nitsch Engineering recommends that the ZBA follow the recommendations presented by Conservation Commission.

Zoning Board of Appeals Rules and Regulations

18. The Applicant is seeking a waiver to allow for reduced front, side and rear setbacks (proposed: 33 feet front, 10 feet side, 10 feet rear, required: 40 feet). Also to allow for buildings closer than 100 feet from the boundary of the property, closer than 50 feet from any Open Space and closer than 30 feet from any other residential unit. The project proposes to locate a unit within 15 feet of the boundary line, 35 feet from the Open Space, and 16 feet from each other at their closest points. Nitsch Engineering recommends that the Applicant provide additional screening in the reduced setback area if the waiver is approved by the ZBA. Nitsch Engineering recommends that the Applicant provide a detailed Landscape Plan for review.

Applicant Response: The front yard setback waiver is withdrawn. All of the other proposed building setbacks are graphically shown on the revised plans. A Landscape Plan has been provided.

Nitsch Response: The Landscaping Plan, as revised on November14, 2014, does not provide any plantings behind the units that would provide additional screening in the reduced setback area. Therefore, the Applicant has not addressed the concerns in the initial comment. Based on comments received at the November 5, 2014 meeting, the Applicant should also confirm with the Fire Chief that adequate separation is being provided between the back of the units/decks and the existing tree line.

19. The Applicant is seeking a waiver to allow for twenty units on a Private Driveway as shown on the plan. Section A. Zoning Bylaw 5, limits the number of units on a common drive to six (6). The proposed project has 20 units on a Private Driveway not a Common Driveway as defined in the Carlisle Zoning Bylaw. Nitsch Engineering notes that this is a dense development for the site. Nitsch Engineering recommends that the Applicant address any life safety concerns including emergency access, snow removal, emergency access for multiple vehicles, and space for suppressing fires.

    Applicant Response: It has been determined that the project proposes a "private driveway" and not a common driveway. The waiver request was offered if it was determined that the proposed access-way would be considered as a "common driveway". I believe this issue has been determined that the project is proposing a private driveway with any necessary waivers to those requirements. The specific response to the comment is already commented on in response 6 above.

    Nitsch Response: Nitsch Response: Nitsch requests that the Applicant provide the updated traffic study for review. Upon receipt, additional comments will be provided. The Applicant has revised the roadway based on comments provided by fire and police, and the 24-foot width meets the Town of Carlisle requirements. However, Nitsch notes that although the buildings have been adjusted to provide a minimum 30-foot separation, there are several units where the porches are included within that dimension and may also be considered combustible structure. Further review and comment by the Fire Chief is recommended. Nitsch defers to the ZBA on whether twenty units are appropriate for the proposed roadway.

20. The Applicant is seeking a waiver from the requirement that a "Common Drive" exceeding 300 feet must have turnouts "at reasonable intervals along the driveway, but at least every 300 feet to allow vehicles to pass." The project proposes no turnouts. Nitsch Engineering recommends that the Applicant provide turnouts every 300 feet as required as it appears that there is sufficient space for the turnouts along the proposed roadway.

    Applicant Response: Same as 19 above. See response 6. Additionally the proposed driveway is now proposed at 24 feet wide, 4 feet wider than required for a subdivision roadway which clearly obviates the need for turnouts.

    Nitsch Response: Based on the meeting with the Police and Fire Chief, since the roadway width has been widened to 24 feet, there does not appear to be any concerns with the lack of turnouts along the proposed roadway. Nitsch recommends that the ZBA grant the requested waiver.

21. The Applicant is seeking a waiver from the requirement that dead-ends will provide at the closed end cul-de-sac turnaround... "with an outside diameter of the paved surface of 140 feet. A landscaped island having a diameter of 100 feet shall be provided in the center of the turn-around..." The project proposes an outside diameter of the paving of 120 feet and a landscape island having a diameter of 75 feet. Nitsch Engineering recommends that the Applicant provide turning movements to confirm that fire apparatus will be able to access the proposed roadway and address any life safety concerns presented by the Police and Fire Departments. Nitsch Engineering recommends that the Applicant explain to the ZBA why the project is not able to meet the Town minimum requirements for the proposed cul-de-sac.

    Applicant Response: This comment is virtually identical to 13. See response to comment 13 above.

    Nitsch Response: In the November 5, 2014 meeting, Fire Chief expressed a preference for a cul-de-sac with a tear drop shape. Again, Nitsch respectfully requests an updated turning template to document that the revised roadway layout/geometry is accessible for the largest Carlisle fire apparatus. This revision should be reviewed by fire department for determination of life safety issues. If there are no additional concerns from the fire department, Nitsch recommends

granting the requested waiver.

22. The Applicant is seeking a waiver from the requirements that: "No more than three (3) dwelling units shall be accessed directly from a cul-de-sac." The project proposes four (4) units to access on the cul-de-sac. Nitsch Engineering recommends that the Applicant explain to the ZBA whether this layout will satisfy any life safety concerns including emergency access, snow removal, emergency access for multiple vehicles, and any other concerns noted from the Police and Fire Departments.

    Applicant Response: This comment is virtually identical to 14. See response to comment 14 above.

    Nitsch Response: There were no specific issues raised by the Fire Chief with respect to the number of units on the cul-de-sac. However, Nitsch notes that there may be some concern with the spacing of the units, because as previously mentioned, there is less than 30 feet between some of the porches. This may warrant additional review by the Fire Chief. If acceptable to the Chief, Nitsch defers to the ZBA for the determination on if four (4) units are acceptable on the cul-de-sac.

23. The Applicant is seeking a waiver from the requirements that "A development shall not have fewer than two (2) noncontiguous accesses within existing Town roads except in a development of 10 or fewer homes or units having legal frontage on a single dead end street." The proposed project will have 20 units on a Private Driveway with only one (1) access within an existing Town roadway. Nitsch Engineering recommends that the Applicant address any life safety concerns within the development based on one (1) entrance off Long Ridge Road and explain why a the project cannot have two (2) entrances. Nitsch Engineering will provide additional comments after review of the Applicant's traffic report.

    Applicant Response: This comment is virtually identical to 6. See response to comment 6 above.

    Nitsch Response: Nitsch Response: At the November 5, 2014 meeting, the Police Chief (and Fire Chief) indicated that his preference would be to provide a means of secondary access to Long Ridge Road via connection between Prospect Street and Nowell Farme Road. Nitsch Engineering recommends that the Applicant continue to evaluate the possibility of providing this secondary access route to Long Ridge Road and provide an update to the Board on the feasibility of this secondary route. Nitsch defers to the ZBA on the question raised by the Applicant on if units are lots and if this regulation is applicable to the project.

Comprehensive Permit Fee Waivers

24. The Applicant is seeking a waiver to reduce total filing fee to $4,000. Nitsch Engineering defers to the ZBA on the required filing fee.

    Applicant Response: This waiver request for filing fee reduction is still valid.

    Nitsch Response: Nitsch Engineering defers to the ZBA on the required filing fee.

Board of Health Regulation Waivers – Supplemental Regulations for Sewage Disposal Systems

25. The Applicant is seeking a waiver from the well setback requirement of 150 feet to allow for a setback of 100 feet. Nitsch Engineering defers to the comments provided by GHC and the BOH on the minimum allowable well offset from the existing and proposed septic systems required to protect the drinking water supply.

    Applicant Response: The waiver request for the well setback of 150 feet to 100 feet complies with State

Environmental Code, Title 5.

Nitsch Response: Nitsch Engineering defers to the comments provided by GHC and the BOH on the minimum allowable well offset from the existing and proposed septic systems required to protect the drinking water supply. Nitsch Engineering and GHC have not received an updated hydrologic and geologic study for review at this time.

26. 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 notes that design calculations have not been provided for the proposed septic systems and defers to the Board of Health on this waiver request.

Applicant Response: The waiver request for the design flow of 110 GPD/BR complies with Title 5. Garbage grinders will be prohibited. It is noted that for a combined system of 6 or 7 units (18-21 bedrooms), as proposed, the design flow is 110 GPD/BR so a waiver, per se, may not be required.

Nitsch Response: Nitsch Engineering notes that design calculations have not been provided for the proposed septic systems and defers to the Board of Health on this waiver request.

27. 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 notes that design calculations have not been provided for the proposed septic systems and defers to the BOH on this waiver request.

Applicant Response: This comment appears to be the same as 26 above. See response to 26.

Nitsch Response: Nitsch Engineering notes that design calculations have not been provided for the proposed septic systems and defers to the BOH on this waiver request.

Town of Carlisle Water Supply Regulations

28. The Applicant is seeking a waiver from the requirement that "all private wells shall be located a minimum of 25 feet from the normal driving surface of any public roadway or a minimum of 15 from the road right-of-way, whichever is greater." The Applicant is seeking this waiver to allow the well to be within less than 15 feet from the Private Driveway. Nitsch Engineering notes that this waiver appears to refer to the existing drinking water well that would be located adjacent to the proposed driveway. Nitsch Engineering defers to the comments provided by GHC and the BOH regarding the minimum allowable well offset from pavement required to protect the drinking water supply.

Applicant Response: The existing well servicing the existing house at 100 Long Ridge Road is hereby changed in use to be an irrigation well, not potable water supply.

Nitsch Response: The use of the well in question has been changed from drinking water to irrigation. The Applicant should confirm if the requested waiver is still necessary.

SUMMARY

Based on the revised information submitted for the proposed project at 100 Long Ridge Road for the layout, grading, and stormwater design, it generally appears that the project is technically feasible. However, Nitsch Engineering recommends that the Applicant revise the plans and calculations as requested in the comments above. The feasibility of the well and septic systems will be reviewed by GHC once the Applicant has provided an updated hydrologic and geologic report for review.

Nitsch Engineering recommends that the following items be addressed. Nitsch Engineering notes that this list below highlights most, but not all, of the items that require additional information. Nitsch Engineering notes the following:

- Confirm with the Carlisle Fire Department that the 30,000 gallon fire cistern is appropriate for the development;
- Confirm with the Carlisle Fire Department that porches within 30-feet of the nearest building unit are acceptable;
- Confirm with the Carlisle Fire Department that the current cul-de-sac layout (instead of a tear-drop layout) is acceptable;
- Provide information that indicates the Ten Stormwater Standards have been met;
- Provide an updated traffic report based on the new roadway geometry and layout;
- Provide an updated hydrologic and geologic report for well testing;
- Provide a plan or detail that indicates additional treatment of the stormwater discharge toward the wetland near the Long Ridge Road intersection;
- Update the ZBA on Conservation and Board of Health permitting;
- Adjust the location of the erosion control at the rear of the site;

We look forward to meeting with the ZBA at the hearing scheduled for Monday, January 5, 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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