

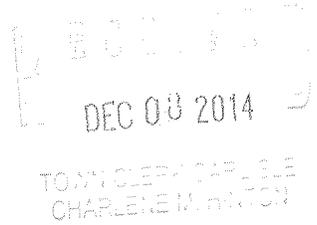
Brem-122-12.08.2014



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December 8, 2014

Lisa Davis Lewis, Chair
Carlisle Board of Appeals
Town Hall
66 Westford Street
Carlisle, MA 01741



Re: 100 Long Ridge Road
Civil Engineering Response to Nitsch Letter of 10-24-14

Dear Ms. Lewis and the members of the Board of Appeals:

This office has made substantial revisions to the plan for the above referenced project based on comments received from the peer review of Nitsch Engineering, from the Fire and Police Departments, and from our various public hearings.

To begin, the project has a proposed name: "The Birches". I am sure that various town officials will need to approve the project name.

The primary change to the civil engineering plans is the preparation of a complete final design plan set. This final design plan set consists of 12 sheets of full 'D' size, 24"x36" scaled drawings entitled "The Birches, Residential Site Plan, dated November 14, 2014, prepared by this office (Plans). Sheet 12 is the Landscape Plan which is being revised by Gardner & Gerrish and will be sent by separate cover.

As a full set of engineered drawings, many changes are included therein. Of particular note are the following:

- A. The proposed private driveway width increased to 24 feet in width from 20 feet. The original 20 foot width design did conform to the Town of Carlisle Subdivision Regulation. However, the Carlisle Fire Department requested 24 feet. This is a typical recent request of the Fire Department for all project site accesses. The revision incorporated with these plans include a private driveway width of 24 feet, which is 4 feet wider than that which is otherwise required for a public road in Carlisle.
- B. The maximum road grade was reduced from 8.0% to 6.0%. This negates the need for a waiver of road grade.
- C. Revisions were made to the profile so that the vertical curves in sag conditions to conform to the Carlisle Subdivision Regulations eliminating the need for a waiver of the "K" value, which is a factor representing the sharpness of the parabolic vertical curve.
- D. The plan provides roof infiltration systems for each new building incorporating a key component of Low Impact Development (LID).
- E. The plan provides ten (10) distinct "rain gardens" as specially designed stormwater features incorporating LID principles which will assist in polishing and infiltrating the runoff during regular storm events.

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- F. The plan provides for a Bio-Retention area, another LID technique, to help to cleanse the rainwater from 2 additional catch basins suggested by the peer review.
- G. The plan provides three “Stormwater Buffer Zones”, a proprietary inlet device intended to remove Total Suspended Solids, floatables, and other stormwater debris.
- H. The plan provides a 30,000 gallon water filled cistern. The fire water source in the form of a cistern is at the request of the Fire Department, which is neither a town or state requirement.
- I. The plan relocates Septic System 1 to the north side of the road with a relocation of Unit 1 to the south side of the road and also locating this unit back from the road to provide 40’ front setback as required in the Carlisle Zoning eliminating the need for the front yard setback variance.
- J. The plan provides two additional wells to allow for no more than 2 units per well. The existing well that presently provides water to Unit 20 is proposed to change its use from private domestic water supply to be an irrigation well.
- K. The plans are final design plans showing the 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.
- L. A Final Stormwater Management Report with Operation and Maintenance Plan, revised date of 12-05-2014 is provided.
- M. A Low Pressure Sewer design is provided for the proposed E/ONE individual pump systems by FR Mahoney Associates in two volumes: a Pressure Design Report dated 12-08-2014 and a Cost & Design Analysis by E/ONE.

The following comments are in response to the numerical equivalent of the referenced peer review letter.

- 1. Summary of Existing Conditions - No response – peer review comment only on existing conditions.
- 2. Summary of Proposed Conditions - No response – peer review comment only on proposed conditions.
- 3. MEPA review is not required. None of the thresholds are exceeded.
- 4. 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.
- 5. The grading will not impinge on the wetland resource area. See Plans.
- 6. See Plans, Sheet 3.

7. Any open space provided will be owned by the Condominium Trust, Master Deed, and will not be under a Conservation Restriction.
8. 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.
9. The project increased the private domestic water supply wells from 9 to 11 with the existing well to be used as the irrigation well.
10. 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.
11. 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).
12. The project will comply with the NPDES program as monitored by the US EPA. The peer reviewer recommends such condition, which is acceptable.
13. 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.
14. 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.

15. 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.
16. Final design construction plans (Plans) are hereby provided including requested details.
17. 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.
18. No easements are proposed. All infrastructure improvements will be owned by the Condominium Trust.
19. 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.
20. 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.
21. The applicant met with the Police Chief on October 31, 2014.
22. 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.

23. Signage location and size have been added to the plans.
24. 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.
25. No ledge has ever been encountered in the area of proposed development. Any removal will comply with Carlisle noise and state regulations.
26. A Landscaping Plan signed by a Registered Landscape Architect was submitted on or about October 3, 2014. Native plant are proposed. The Landscape Plan (Sheet 12) will soon be updated to reflect the various proposed rain gardens and other features.
27. No exterior lighting is proposed other than on the individual residential buildings.
28. 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
29. Details of construction including rims, inverts, pipe type, pipe lengths, and pipe slopes are provided on the Plans. Several tables are provided.
30. Details of all piping is 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.
31. The proposed 30,000 gallon water filled fiberglass fire cistern is provided with standard details shown on the Plans.
32. 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.
33. 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.
34. 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.

35. Soil test pit logs are submitted under separate cover.
36. Soil test pit logs are submitted under separate cover.
37. 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.
38. Additional catch basins are provided in the revised plans near STA 6+20.
39. Final Stormwater calculations are provided with the revised plan set.

MassDEP Stormwater Management Standards:

It is important to note that MassDEP clearly outlines the jurisdiction applicable to the Stormwater Management Standards to be only when there is a discharge of stormwater within 100 feet of a regulated wetland resource area. The southern portion of the site discharges at a point further than 100 feet from the wetland and therefore, the Stormwater Management Standards are not applicable, by jurisdiction, to the drainage associated with Phase I including the first 496 feet of private driveway.

In any case, the intent of this revised design is to comply with the Stormwater Management Standards, both in Phase I and Phase II.

Standard 1: All storm water is treated prior to discharge.

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.

Standard 2: No increase in Peak Discharge Rates

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.

Standard 3: Annual Recharge

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.

Standard 4: 80% TSS Removal

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.

Standard 5: Not Applicable

Standard 6: Not Applicable

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.

Standard 7: Not Applicable

Standard 8: Erosion Controls

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.

Standard 9: Operation and Maintenance Plan

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

Standard 10: Prohibition of Illicit Discharges

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

Waivers:

1. 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.
2. 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.
3. 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.

4. 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.
5. 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.
6. 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.
7. This waiver request is similar if not identical to that of 6 above and therefore the response is repeated here. See 6 above.
8. The traffic study confirms that the private driveway offset to Garnet Road at 110 feet is acceptable and within the requirements of AASHTO.
9. 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.
10. 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.
11. The waiver request for the Sag Vertical Curve will be withdrawn.
12. 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.
13. 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.

14. 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.
15. 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.
16. 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.
17. 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.
18. 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.
19. 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.
20. 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.
21. This comment is virtually identical to 13. See response to comment 13 above.
22. This comment is virtually identical to 14. See response to comment 14 above.
23. This comment is virtually identical to 6. See response to comment 6 above.
24. This waiver request for filing fee reduction is still valid.
25. The waiver request for the well setback of 150 feet to 100 feet complies with State Environmental Code, Title 5.
26. 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.

27. This comment appears to be the same as 26 above. See response to 26.
28. 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.

In summary, a full set of construction design plans for the site and final Stormwater Report is provided with this response including a complete design of the private driveway, grading, drainage, utility locations, and construction details. Although clearly not required pursuant to the laws and regulations related to a Comprehensive Permit Application (MGL Ch. 40B), this was determined to be the best method to address the comments received from the peer reviews.

The stormwater design incorporates Low Impact Development (LID) practices providing the latest design concepts for treating and conveying stormwater runoff.

I would like the opportunity to present my response to the Board at a subsequent Board of Appeals hearing and will take questions at that time.

Sincerely,



Jeffrey A. Brem, PE
Principal Engineer

Cc: Client