

November 22, 2016

Ashby Planning Board
Ashby Town Hall
P.O. Box 155
895 Main Street
Ashby, MA 01431

Attn: Mr. Alan W. Pease, Clerk

re: Independent Engineering Review
OSRD (Special Permit) Project
Old Northfield Road
Ashby, MA 01431

Dear Mr. Pease:

Thank you for providing McKenzie Engineering Co., Inc. with the opportunity to furnish the Ashby Planning Board with consulting engineering services. In response to your request, we have reviewed definitive subdivision drawings and a Stormwater Report prepared by Hancock Associates for the project referenced above, and we performed a compliance assessment of the project with respect to the Town of Ashby "Rules and Regulations Governing the Subdivision of Land" (Subdivision Regulations), effective February 1992, as amended June 14, 2006, last edit June 15, 2006. The project was also reviewed for general compliance with the Town of Ashby *Zoning By-Laws*, adopted June 20, 1979, as amended through May 7, 2016. The following documents were provided for our review:

- "Open Space Residential Development Special Permit for Brite Excavating Company, Inc. A Ten (10) Lot Open Space Residential Subdivision" dated October 17, 2016 drawings prepared by Hancock Associates breakdown as follows:

<u>Sheet No.</u>	<u>Title</u>	<u>Date</u>
1 of 17	TS – Title Sheet... General Project Information	October 2016
2 of 17	EC1 – Existing Conditions Plan in Ashby, MA	October 2016
3 of 17	EC2 – Existing Conditions Plan in Ashby, MA	October 2016
4 of 17	OSRD-O – OSRD (Overview)	October 2016
5 of 17	CYP – Conventional Yield Plan (Overview)	October 2016
6 of 17	CSP – Conventional Street Plan (1-5)	October 2016
7 of 17	CSP-P – Conventional Street Profile (1-5)	October 2016
8 of 17	CSP – Conventional Street Plan (6-9)	October 2016
9 of 17	CSP-P – Conventional Street Profile (6-9)	October 2016
10 of 17	DEF – Definitive Subdivision... (Sheet 1 of 2)	October 2016
11 of 17	DEF – Definitive Subdivision... (Sheet 2 of 2)	October 2016
12 of 17	ESC – Erosion and Sediment Control Plan	October 2016
13 of 17	OSRD – OSRD Street Plan	October 2016
14 of 17	OSRD-P – OSRD Street Profile	October 2016
15 of 17	OS-SP – OSRD Site Plan	October 2016
16 of 17	DET – Detail Sheet	October 2016
17 of 17	DET – Detail Sheet	October 2016

- A report titled *Stormwater Report In Support of: Ashby, MA 01431 OSRD (Special Permit) Project For: Brite Excavating Company, Inc.* dated September 17, 2016, prepared by Hancock Associates.

- A *Development Impact Statement* not dated, prepared by Hancock Associates.

Copies of the preliminary subdivision documents were not provided for review. Our findings are as follows:

Regulatory Compliance Commentary – Definitive Subdivision

The drawings generally provide the information prescribed in the Ashby *Subdivision Regulations* for a definitive subdivision submittal. We offer the following comments regarding the submitted drawings with respect to the *Subdivision Regulations*. On the provided drawings plans there is a list of requested waivers regarding definitive subdivision plan. These waivers are listed again below. Where waivers are simply restated below without commentary, we do not have any reservations regarding them.

<u>Subdivision Regulations Reference(s)</u>	<u>Comment</u>
2.5.0	The Planning Board may require a developer of more than one building lot to submit a Development Impact Statement (DIS). We generally agree with the Impact Statement.
2.5.1	This requirement is covered in the Development Impact Statement provided.
3.2.0.5	A total of 8 deep observation holes (DOH) were excavated and tested in September 17, 2014 and are shown on the OS-SP – OSRD Site Plan and the results of those tests were presented in the submitted report, although the OS-SP – OSRD Site Plan only lists DOH's 914-1 through 914-6, leaving two (2) DOH's unlisted. Furthermore, any approved lots would be required to be tested and pass for Board approval.
3.2.1.2.2	Existing topography is not shown to within 50 feet of the subdivision in all areas. The Board may consider waiving this requirement since proposed grading is not indicated within close proximity of any property border.
3.2.1.2.4, 3.2.1.3.0, 4.0.7, 4.2	Waivers have been requested to allow the elimination of sidewalks and bicycle paths in consideration of the size of the OSRD subdivision.
4.0.11, 4.0.11.2, 4.5	A waiver was requested to delete required trees and plantings since the site is heavily wooded.
4.0.11.1, 4.12	Efforts should be made to preserve existing large caliper trees as required.
4.0.11.2	A waiver was requested to delete the requirement to plant trees along road way due to existing topography and characteristics.
4.1.0.4	It is required that dead-end streets shall not be longer than 800 feet. Due to local topography we suggest waiving this requirement, since the dead end street is designed to be no more than 825 feet in extension.

- 4.0.13 Nowhere in the plans or in the report, street lights are mentioned or proposed. These should be included for the street as well as for the cul-de-sac.
- 4.1.0.5.0 A waiver was requested to permit the grade at the cul-de-sac (dead-end) to be greater than 2%.
- 4.1.0.8 A waiver was requested to have rounded property line at street intersection because cul-de-sac R.O.W. ties into an existing 50 feet R.O.W.
- 4.1.3 We are in general agreement with the Development Impact Statement about adequate access.
- 4.3.1 A waiver was requested to have Cape Cod berm for the entire R.O.W. instead of granite curbing.
- 4.8.2 The stormwater management system was designed in accordance with the prescribed method and design storms cited in the Subdivision Regulations. See the Drainage Analysis Review starting on page 5.
- 4.8.3 A waiver is requested to allow for less than 4 feet of cover to stormwater pipes. It is our recommendation that all pipes should have a minimum of 3 feet of cover.
- 4.8.4 A waiver is requested to allow for pipes longer than 250 feet.
- 4.8.5 Catch basins and Manholes should be at least 7-1/2 feet deep with a minimum of 36" sump below pipe invert. We recommend that these minimum requirements are shown in the DET – Detail Sheet as another mean of reinforcing these requirements.
- 4.8.9 We reviewed the Flood Insurance Rate Map (FIRM) # 25017C0045E (copy attached) as well as the OLIVER: MassGIS's Online Mapping Tool. These maps indicate that no areas of the site are located within 100-year (Zone A) or 500-year (Zone X) floodplains as mapped by FEMA as part of the National Flood Insurance Program.

This project is filed under the Open Space Residential Development, regulated under Section 9.4 of the Zoning By-Laws. The requirements under OSRD for Area, Frontage and Minimum Lot Width at building line are met. Setbacks for an OSRD are not specifically defined by section 9.4.5 which defines that "the Planning Board may reduce some or all of the dimensional (intensity) requirements of the zoning district in which the OSRD is to be located, if the Board finds that such reduction(s) will result in better site design and the provision of permanently protected open space." Comparing the proposed setbacks with the required setbacks for the Residential/Agricultural zoning, we found that they do not meet the requirements and the board would have to review them and allow the proposed reductions in these values. See Table 1 attached for the proposed/required values comparison.

Regulatory Compliance Commentary – Open Space Residential Development

The drawings generally provide the information prescribed in the Ashby *Zoning By-Laws* for an Open Space Residential Development submittal. We offer the following comments regarding the submitted documents and associated drawings relative to the *Zoning By-Laws*.

Zoning By-Laws Reference(s)

9.4.3.3

Comment

This section partially states "The total number of lots shown on the Open Space Residential Development plan shall not exceed the number of lots which could reasonably be expected to be developed under a conventional plan without zoning variances or waivers and in full conformance with zoning, subdivision regulations, the Wetlands Protection Act and Board of Health Regulations."

Upon our review of the Conventional Yield Plan (1-5) on CSP plan we were able see the following issues:

1. The maximum street grade of 8% (Section 4.1.2.0 – Rules and regulation Governing the Subdivision of Land) is being observed. However the following section (4.1.2.1) states that "On any street where the grade exceeds 6.0% on the approach to an intersection or cul-de-sac, a leveling area with a slope of not more that 4.0% shall be provided for a distance of no less than 100 feet measured from the nearest exterior line of the intersection street." and this requirement is not met.

2. There are no proposed finished grades on the CSP plan. This lack of elevation values makes it impossible to evaluate the subdivision, including what we believe would be many retaining walls to achieve the proposed street grade. It appears that retaining walls by the road would be needed and could achieve heights of 20 feet and above.

3. To have the proposed street as designed, the street elevation would be up to 20 feet below existing grades making wetland crossings impossible. Also, even though there is apparently nothing being built in the wetlands' 100 foot buffer zone, since the slopes are very steep, there will be the need to modify the terrain with retaining walls or grade changes within the buffer zone to accommodate all proposed changes.

4. Section 4.1.2.3 states that "street grades shall be designed in relation to existing grades such that the volume of cuts and fills made within the right-of-way approximately balance, except to offset peat, boulders, or other unusable material to be removed." The proposed street does not balance cuts and fills. It only proposes cuts through existing soil to reach the defined street grade achieving no balance.

5. Section 4.10.0 states that "all slopes resulting from grading of streets and sidewalks shall not exceed one (1) foot to three (3) feet horizontal in fill; one (1) foot to three (3) feet in cut; and one (1) foot to three-quarters (3/4) foot in ledge." There is no indication of slopes resulting from grading of the streets, but according to our observations, if no retaining walls are being installed – which is very unlikely due to the existing terrain grades – there will be slopes greater than what is required.

It is our opinion that the proposed conventional subdivision does not meet the requirements to allow for 9 lots in a reasonable fashion without waiving some of the requirements.

9.4.4.4.d

This section states that “The percentage of marginal or unbuildable areas that can count towards the minimum required amount of permanently protected open space shall be directly proportional (1:1) to the amount of such land in the parent parcel.”

It is our finding that the Open Space provided for this OSRD does not meet the requirements put forward in this item. The OSRD-O plan has a set of calculations for the Open Space requirements that we generally agree upon. However, the important number to verify if the proposed area meets the Zoning By-Laws requirement is not being calculated. Calculation for checking the requirement is as follows: The percentage of Marginal Land in the Total Land is given in their plan and it is said to be 37.86%. Therefore, the maximum Marginal Land in the Open Space area needs to be less than or equal to 37.86%. Their plan shows that the Open Space area is set at 440,140 Square Feet and that the Marginal Land area inside the Open Space area is 280,887 Square Feet, which renders 63.82% of the Open Space area provided. Based on the 37.86% maximum Marginal Land area required in the Open Space, it could only have a maximum of 166,637 Square Feet of Marginal Land which shows that it fails the requirement exceeding this limit by (280,887-166,637=)114,250 Square Feet. See Table 2 attached for a detailed calculation.

Drainage Analysis Review

We have reviewed the plans and details with respect to drainage controls and have found them to be generally satisfactory. We do not anticipate any significant impacts on potable water wells, abutting septic systems (if present), overland runoff and groundwater flows on abutting properties. We offer the following comments and recommendations regarding specific details the stormwater management system.

The drainage analysis for the proposed development was performed utilizing the *HydroCAD* Stormwater Modeling System computer program, release 10.00. The runoff computations made by *HydroCAD* for this project are based upon the USDA Soil Conservation Service (now Natural Resources Conservation Service) Technical Release 20, commonly known as TR-20. TR-20 is the numerical unit hydrograph procedure used to calculate storm runoff volume, peak rate of discharge, and storage volumes for floodwater reservoirs that is specified in the *Ashby Subdivision Regulations* at 4.8.2.

We reviewed and generally agree with the calculation methods prepared by Hancock Associates for all pre- and post-development watershed conditions with respect to drainage areas, slopes, and cover conditions. The calculations and summary data indicate that the post development rates of runoff would not exceed the pre-development rates for the 2-, 10-, 25- and 100-year design storms due to the attenuating effects of the detention basin and modifications to watershed areas.

On Section II of the report, under section MASSDEP STANDARD 3, the report shows the calculation for Draw Down Time for each of the proposed Infiltration systems. The formula used in this section is $DrawDownTime = \frac{R_p}{(K_{rain}) \cdot (PracticeBottomSurfaceArea)}$, which is in accordance with the Massachusetts Stormwater Handbook. For each of the proposed Infiltration System, the areas are chosen and defined in the plans. All Rain Gardens are defined as having the same infiltration area of 450 sf and the

Infiltration Basin is bigger and well defined within the plans (3,550 sf). The Rv for each of them are calculated and we agree with the calculated value. However, we find that the K-Rawls Conductivity they use is for a soil that is *not* found within the site. The report states, in Section I, Predevelopment Conditions that “The soils are relatively consistent throughout with “C” type soils in the west and “C & D” soils in the east, as confirmed with onsite soil testing and NRCS soil mapping”. Also, in the same section, the report defines the soil type based on the NCRS “C” type as “Sandy Loam”. On Section II, in the infiltration Systems table on page 8, the report shows that the Conductivity (K) being used to calculate the Draw Down Time is 2.41 in/hr. This value is taken from Table 2.3.3 of the Massachusetts Stormwater Handbook Vol. 3. In this table, however, this value is not for the soil type listed in the project as we mentioned above. Table 2.3.3 (see below) shows that the K value of 2.41 is for NCRS soil group A – Loamy Sand and not for NCRS soil group C as the report states. Also, even if the Texture Class being chosen is Sandy Loam, as the report states, it does not match the NRCS soil group C, which would need to be classified under Silt Loam or Sandy Clay Loam giving us a K value of 0.27 or 0.17 respectively.

Table 2.3.3. 1982 Rawls Rates¹⁸

Texture Class	NRCS Hydrologic Soil Group (HSG)	Infiltration Rate Inches/Hour
Sand	A	8.27
Loamy Sand	A	2.41
Sandy Loam	B	1.02
Loam	B	0.52
Silt Loam	C	0.27
Sandy Clay Loam	C	0.17
Clay Loam	D	0.09
Silty Clay Loam	D	0.06
Sandy Clay	D	0.05
Silty Clay	D	0.04
Clay	D	0.02

The table below compares the results found in the report with two different C soil group infiltration rates:

HydroCAD I.D.	Surface Area (sf)	HSG (NCRS)	Conductivity (K) (in/h)	Recharge Volume Rv (cf)	Draw Down Time (h)	Test Pit(s)	Description
P1	450	Report	2.41	436	4.82	914-3	Bio-Swale/Basin, Lots #1 & #2
PA	3550	Report	2.41	1069	1.50	412-1 to 4	Lots #3 & #4 and Infiltration Basin
P1	450	C (Silt Loam)	0.27	436	43.06	914-3	Bio-Swale/Basin, Lots #1 & #2
PA	3550	C (Silt Loam)	0.27	1069	13.38	412-1 to 4	Lots #3 & #4 and Infiltration Basin
P1	450	C (Sandy Clay Loam)	0.17	436	68.39	914-3	Bio-Swale/Basin, Lots #1 & #2
PA	3550	C (Sandy Clay Loam)	0.17	1069	21.26	412-1 to 4	Lots #3 & #4 and Infiltration Basin

As can be seen on the table above, the Draw Down Time significantly increases when the more appropriate values for the soil groups are used. Although these values still fall under the maximum DDT allowed (72 hours), they are much closer to the required limit set forth by the Standard 3 of the Massachusetts Stormwater Report.

Also, the values stated in the report for some variables are inconsistent (similar to inconsistencies we also pointed in some CAD drawings) and should be carefully verified. As one example, also under MASSDEP STANDARD 3 in Section II of the report, the total calculated Required Recharge Value is “1,147 cf Rv=1,125 cf” which already shows inconsistency. A few lines below, in the report, it is stated that “Therefore, the total available storage/recharge volume provided, based on low flow outlet control elevations (full volume) is 4,121 cf (> 1,050 required)”. In the Required Recharge Volume (Static Method) in the appendix, when we add the individual Required Recharge Values for all sites, we get

yet another value: $R_v=1,127cf$. Since they are representing the same volume, the values 1,147cf, 1,125cf, 1,050cf and 1,127cf should be the same. These values should be verified and be consistent throughout the report and all plans.

There might be other issues with the report, but as of this moment in our analysis, there is already enough problems to state that it needs to be fully and completely revised by Hancock associates prior to be brought again for consideration.

We reserve the right to present only this brief analysis and if the board approves this OSRD the drainage analysis will need to be reviewed once more for accuracy and suitability for the final proposed subdivision.

Design and Plan Review Commentary

The following were noted during our review but, in our opinion, should not delay Site Plan approval if the Board is inclined to do so.

- The OSRD Street Plan (OSRD) and the OS-SP plan label the bottom of the proposed open (dry) stormwater infiltration basin as 226 which appears to be a CAD error. The level is stated to be 826 in its description at the OSRD plan as well as in the detail on DET plan. This should be corrected to avoid confusion.
- The OSRD Street Plan (OSRD) shows the street level at each level change for the R.O.W. but the labels between levels 874 and 870 is set to 868. This section should be labeled as 872 according to the OSRD-P (Street Profile), since there is no valley on the R.O.W. This seems to be a CAD error.
- The OS-SP site plan scale has a wrong value. The legend states 1" = 20' and it needs to be updated to be 1" = 40'.
- There are various inconsistencies throughout the plans with regards to areas of the same lots. For example, the OSRD-O plan states that "Total Area = 19.65 Ac." but the total area included in the Lot Summary above it only adds up to 18.8 Ac. Another example is on plan EC2 where, despite the Total Area in Acres being the same as above, 19.65 Acres, the Total Area in Square Feet (856,188) is different from the one in plan OSRD-O (856,311). Measurements should be consistent throughout all plans.
- In the Stormwater report there are two plans (inserts) labeled PRE and POST with the Subcatchment, Pond and Analysis locations. On the POST plan there is a notes section that does not refer to the project being reported and analyzed. The Notes section should be updated to match the current project.

Conclusions

We find that despite agreeing that an Open Space Residential Development is the best option for the Town, this OSRD presents too many problems to be viable and does not comply with all the regulations set by the Town requirements under the Rules and Regulations Governing the Subdivision of Land and the Town of Ashby Zoning By-Laws.

It is our opinion that the number of lots for a conventional subdivision as proposed by this project is not compatible with the area available due to grade and wetland conservation issues. Therefore, the conventional plan needs to be reviewed to determine the real number of allowed lots to comply with the subdivision and zoning by-law rules set by the town and also with the wetlands protection act.

It is also our opinion that, even if the number of lots were reasonable, the proposed final subdivision does not meet the minimum requirements set by the OSRD section of the Zoning by-laws. This is due to the fact that the required Marginal Lands in the proposed Open Space is far bigger than what is required by the Zoning By-Laws as explained in the Design and Plan Review Commentary section above.

There are also some issues with the calculations in the drainage report which need to be addressed prior to a final analysis of the approved subdivision.

Therefore it is our opinion that this OSRD Subdivision should not be approved by the Board.

Please contact this office if you have any questions or require additional information.

Sincerely,
McKENZIE ENGINEERING CO., INC.

Peter Reynolds, P.E.

Mackenzie Melo, Project Engineer



attach.

pc: ME-3986 Ashby Subdivision Review 11-16

TABLE 1: PARTIAL GEOMETRIC DESIGN REVIEW - OPEN SPACE RESIDENTIAL DEVELOPMENT SUBDIVISION

Project: OSRD - Old Northfield Road - Ashby, MA 01431

Owner: Brite Excavating

Developer: Same

Engineer: Hancock Associates, Joseph D. Peznola

Surveyor: Hancock Associates, Joseph D. Peznola

Reviewer: McKenzie Engineering Co., Inc., Peter Reynolds

Zoning: Subdivision is on a Residential-Agricultural zoning district line on Comprehensive Town Plan (Zoning Map)

The plan is to use the Open Space Residential Development item of the Zoning By-Laws, therefore, the requirements below refer to section 9.4.5 in the referred document

Lot Number	Area, s.f.		Frontage, ft.		Front Yard, ft. ¹		Side Yard, ft. ¹		Rear Yard, ft. ¹		Lot Width, ft.	
	Required	Provided	Required	Provided	Required	Provided	Required	Provided	Required	Provided	Required	Provided
1	40,000	43,000	50	82	75	25	10	25	174	25	80	82
2	40,000	43,380	50	80	75	161	10	25	41	25	80	80
3	40,000	40,160	50	87	75	47	10	25	95	25	80	87
4	40,000	49,450	50	88	75	55	41	25	21	25	80	88
5	40,000	40,000	50	89	75	63	25	25	213	25	80	89
6	40,000	41,000	50	109	75	46	13	25	12	25	80	109
7	40,000	41,770	50	87	75	47	10	25	36	25	80	87
8	40,000	50,980	50	80	75	107	10	25	32	25	80	80
9	40,000	45,730	50	82	75	30	14	25	133	25	80	82

Blue cells indicate requirements met. Orange cells indicate requirements not met.

NOTES:

- These requirements are taken from Residential/Agricultural Zoning since they are not specifically provided for the Open Space Residential Development

TABLE 2: OPEN SPACE RESIDENTIAL DEVELOPMENT SUBDIVISION - LAND SUBDIVISION REVIEW

Project: OSRD - Old Northfield Road - Ashby, MA 01431
 Owner: Britte Excavating
 Developer: Same
 Engineer: Hancock Associates, Joseph D. Peznola
 Surveyor: Hancock Associates, Joseph D. Peznola
 Reviewer: McKenzie Engineering Co., Inc., Peter Reynolds

Zoning: Subdivision is on a Residential-Agricultural zoning district line on Comprehensive Town Plan (Zoning Map)

The plan is to use the Open Space Residential Development item of the Zoning By-Laws, therefore, the requirements below refer to section 9.4 in the referred document

Total Area	Total Marginal Land	Perc.
19.658 Acres	7.443 Acres	37.86%
856311 Sq.Ft	324227 Sq.Ft	37.86%

Open Space Area	Req'd Marginal Land on OS	Perc.
10.104 Acres	3.826 Acres	37.86%
440140 Sq.Ft	166651 Sq.Ft	37.86%

Open Space Area	Actual Marginal Land on OS	Perc.
10.104 Acres	6.448 Acres	63.82%
440140 Sq.Ft	280887 Sq.Ft	63.82%

Marginal Land over the limit
2.622 Acres
114236 Sq.Ft

Orange cells indicate requirements not met

Copy of Hancock's calcs on OSRD-O

OPEN SPACE CALCULATION:

TOTAL SITE AREA: 856,311± SF

MARGINAL LAND (M.L.) CALCULATION (20' HIGHLAND BUFFER & SLOPES GREATER THAN 25%):
 IN OPEN SPACE: 1206,202± SF (50' WET BUFFERS) + [74,688± SF (SLOPES > 25%)] = 1280,890± SF

TOTAL M.L. ON PARENT LOT: 324,227± SF (CALCULATION: 280,897± SF x 0.1786 = 106,151± SF)

DESIGNATED OPEN SPACE PROVIDED: 440,140± SF - (280,897± SF M.L.) + (106,151± SF)

OPEN SPACE PROVIDED IN 20' BUFFER STRIP: 47,518± SF

TOTAL LAND AREA REQUIRED AS OPEN SPACE: 35± (280,704± SF)

TOTAL LAND AREA PROVIDED AS OPEN SPACE: 283,608± SF + 47,518± SF = 331,126± SF (38.2%)