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MEMORANDUM

TO:	Richard Harris, AICP, Director of Planning, South Hadley, MA
FROM:	M. James Riordan, AICP, LEED AP, Senior Project Manager
DATE:	March 4, 2020
SUBJECT:	North Pole Estates Peer Review

Introduction

Weston & Sampson was requested by the Town of South Hadley (the Town) to provide a review of the Definitive Plan of Development for North Pole Estates. The project site is partially developed as a gravel and sand excavation operation, which was originally opened in the 1940s. A Special Use Permit application was submitted in 2018 to expand the excavation operation to include other portions of the project site but was withdrawn in January 2019. A Preliminary Subdivision Plan was submitted for the site in March 2019 and approved April 29, 2019 with a variety of conditions.

This letter report summarizes the results of our review. The letter report is prepared pursuant to our February 11, 2020 contract with the Town, which specifies consideration of the conditions of the Preliminary Subdivision review and requirements under specific Town Bylaws. Requirements of specific Town Bylaws are discussed further under the Peer Review section of this letter report.

In general, materials that we reviewed to prepare this letter report include those submitted with the Definitive Plan. We collected these materials from the Town's website.

As part of our peer review scope of work, we conducted a site visit with representatives of the Town and the applicant's engineer. At that time, we requested additional materials for the transportation elements of our review. As of the writing of this report, we have yet to receive these materials.

Overview of the Proposed Development

North Pole Estates is proposed as a residential subdivision of nine units, but which will eventually be built out to 67 – 72 lots through unspecified subsequent phases in the Agricultural Zoning District and within the Water Supply Protection Overlay District.

The subject property lies within the MassDEP designated Zone II of the Fire District 2 Public Water Supply. The project includes improvements for the subdivision including, but not limited to, roadways, water lines, other utilities, and a Stormwater management system. As part of the application submittal, the applicant has requested six specific waivers from submittal and content requirements under Sections 360-20A, 360-21A, 360-21B(8), 360-21B(16), and 360-21B(21) of the Subdivision Regulations as detailed in the application; therefore, we have provided no comments related to these sections of the Town Bylaws. The subject properties are located along the west side of Hadley Street (aka State Route 47) and along Sullivan Lane and are identified on Assessor's Map Number #54 as Parcels #15 & #20 and on Assessor's Map Number #56 as Parcels #20, #26, #42, #43, #43A, #104, #109, #112, and #121.

Peer Review

This peer review is provided under the following general review topics:

- Stormwater
- Hydrogeology
- Transportation
- Definitive Plan Review

Our review provides a section for each area of concern. The sections are structured include a listing of review standards pursuant to our scope of work, our findings for the review standard, and then additional review findings. Findings are numbered sequentially under each review topic (i.e., stormwater, hydrogeology, etc.). The hydrogeology section of our letter report also includes a general discussion of the project site hydrogeology to provide context for our review comments.

Stormwater

Review Standards for Stormwater

We reviewed the North Pole Estates Definitive Plan pursuant and limited to the following review standards for stormwater:

A. Identify each of the design criteria listed in Section 200-20 and provide an explanation as to whether and how the stormwater elements of the application meet each of the criteria.

B. Provide a thorough assessment as to the submittal's conformity with the other Performance Standards identified in Section 200-17, 200-18, and 200-19 of the Stormwater Management Bylaw.

C. Identify each of the standards of the Massachusetts Stormwater Management Standards as promulgated by the Massachusetts DEP with an explanation as to whether and how the Report and the Plan meets the applicable standards.

Review Findings for Stormwater

Our findings are provided below in the order of the review standards listed above:

Section 200-20

We reviewed the applicants Definitive Plan submission pursuant to requirements of Section 200-20 of the Town's Bylaws and find that it to be prepared in conformance with the stormwater elements except as provided below:

1. Section 200-20(E): *The applicant shall consider public safety in the design of any stormwater facilities. The banks of detention, retention, and infiltration basins shall be sloped at a gentle grade into the water as a safeguard against personal injury, to encourage the growth of vegetation and to allow the alternate flooding and exposure of areas along the shore. Basins shall have a 4:1 slope to a depth two feet below the control elevation. Side slopes must be stabilized and planted with vegetation to prevent erosion and provide pollutant removal The banks of detention and retention areas shall be designed with sinuous rather than straight shorelines so that the length of the shoreline is maximized, thus offering more space for the growth of vegetation.*

   The proposed infiltration basin does not have outlet controls from which to measure "a depth two feet below the control elevation." The overall depth of the basin is 4-feet as measured from the top edge of the basin to the bottom. Side slopes are 4H:1V which conform to the standard and may be sufficient to prevent safety issues associated with entrapment. The board may wish to consider fencing or other public safety measures around the basin.

Section 200-17, 200-18, and 200-19

We reviewed the applicants Definitive Plan submission pursuant to requirements of Section 200-17 to 200-19 of the Town's Bylaws and find that it to be prepared in conformance with the stormwater elements except as provided below:

1. Section 200-17: *To prevent the adverse impacts of stormwater runoff, the stormwater performance standards in this Article VI must be met at new development sites.*

   To prevent the adverse impacts of stormwater runoff, the Town requires that new developments must adhere to Massachusetts Stormwater Management Standards. Section 200-18(A) of the Town's bylaws specifies this requirement. Our comments related to the Massachusetts Stormwater Management Standards our provided below, under our findings related to Section 200-18(A).

2. Section 200-18 (A): *Projects must meet the standards of the Massachusetts Stormwater Management Standards as promulgated by the Massachusetts DEP.*

   The Massachusetts Stormwater Standards are established in Volume 3 of the Massachusetts Stormwater Handbook. There are 10 standards, which include:

- *Standard 1 - No new stormwater conveyances may discharge untreated stormwater to or cause erosion in wetlands or water of the Commonwealth*

  Untreated stormwater is not being discharged to wetlands or waters of the Commonwealth. Much of the stormwater is being retained onsite. This standard has been met.

- *Standard 2 - Peak Rate Attenuation*

  Peak discharge rates have been attenuated based upon the applicant's analysis using TP-40 rainfall data, which meets the standard. Though not required by regulatory standards, we have included recommendations for additional analysis. This is discussed further herein.

- *Standard 3 – Recharge*

  - Soil Evaluation – The applicant has provided an evaluation of soils and groundwater conditions within the proposed infiltration basin area by a licensed soil evaluator, and the design has been based on that evaluation.
  - Required Recharge Volume – The applicant has computed the required recharge volume for the project.
  - Sizing – The applicant has appropriately sized a stormwater BMP (infiltration basin) that collects the required recharge volume.
  - 72-hour Drawdown Analysis – The applicant has demonstrated the proposed infiltration basin meets the 72-hour drawdown requirement.
  - Capture Area Adjustment – The applicant has appropriately applied a capture area adjustment factor to the required recharge volume.
  - Mounding Analysis – The applicant has adequately demonstrated that seasonal high ground water is not present within 4-feet below the bottom of the proposed infiltration basin, therefore a mounding analysis is not required.

- *Standard 4 - Required Water Quality Volume.*

  The applicant has provided calculations for required water quality volume and has designed the proposed infiltration basin with sufficient capacity to capture this volume.

- *Standard 5 - Land Uses with Higher Potential Pollutant Loads*

  The applicant has stated that the proposed land use is not subject to a higher potential pollutant load. We agree with that assessment.

- *Standard 6: Standards concerning discharges within Zone II, Interim Wellhead protection areas of public water supplies, and stormwater discharges near or to any other critical areas*

The site is situated within a Zone II/Water Supply Protection Overlay District. The applicant has implemented the required pretreatment methods and water quality volume computation approach required for discharges to such areas.

- *Standard 7: Computations demonstrating that peak rate attenuation, recharge, and water quality treatment is provided to maximum extent practicable for redevelopment projects.*

  The applicant appears to have fully complied with the standards.

- *Standard 8: Development of an Erosion and Sediment Control Plan*

  The applicant has shown erosion and sediment control measures on their plans and has included a comprehensive erosion and sediment control plan as part of their stormwater report.

- *Standard 9: Operation and Maintenance*

  The applicant has provided an operation and maintenance plan for stormwater best management practices.

- *Standard 10: Illicit Discharge Compliance Statement*

  The project does not discharge to a municipal separate storm sewer system, nevertheless the applicant states their intent to provide an illicit discharge compliance statement prior to discharge of stormwater to post-construction BMPs. The board may wish to adopt this as a condition of approval for the project.

The Massachusetts Stormwater Handbook indicates that proponents of projects subject thereto must consider environmentally sensitive site design and low impact development (LID) techniques to manage stormwater.

The Massachusetts Stormwater Standards list specific credits for LID that the applicant may pursue for compliance in lieu of installing dedicated stormwater management BMPs. While we do not necessarily concur with each of the assertions in Appendix I of the applicant's submission, we do understand from item 6 of Appendix I that the applicant is not seeking LID credit. We find that the applicant has complied with standards 3 and 4 and is, therefore, not required to achieve LID credit standards.

3. <u>Section 200-18 (B):</u> *When the proposed discharge may have an impact upon a sensitive receptor, including streams, storm sewers, and/or combined sewers, the Planning Board may require an increase in these minimum requirements, based on existing stormwater system capacity and standards of other Town boards, including, but not limited to, the Board of Health and the Conservation Commission.*

To our knowledge, the Town has required no increase in the minimum standards. Stormwater quality treatment at the proposed development is to be primarily provided by a single infiltration basin. We find the selected best management practice to be appropriate for the proposed project. The proposed stormwater infiltration system is sized and designed in accordance with MassDEP standards; therefore, we find the applicant has satisfied this requirement.

Section 200-19

We reviewed the applicants Definitive Plan submission pursuant to requirements of Section 200-19 of the Town's Bylaws and find that it to be prepared in conformance with the stormwater elements except as provided below:

4. *Section 200-19 (D): All stormwater management facilities shall be designed to provide an emergency overflow system and incorporate measures to provide a nonerosive velocity of flow along its length and at any outfall." Likewise, reference Section 200-20(A)(7): "Provisions shall be made for safe overflow passage, in the event of a storm which exceeds the capacity of an infiltration system.*

   Much of the proposed development is designed to discharge into an infiltration basin as its final destination. This appears to be a result of the fact that the grading of the development has been designed so as to place end of the proposed roadway and Lots 2, 3 and 4 at elevations approximately matching current grades of what is presently an active sand quarry. As such, if this basin were to theoretically fail to allow infiltration to occur, stormwater would have no other place to go other than to fill the low-lying areas of lots 2, 3 and 4.

   Notwithstanding the issues raised above, the applicant has provided test pit data indicating that much of the project site is underlain by sand and gravel material, including the proposed infiltration basin. The basin is located within a low-lying area of an existing sand and gravel pit. It is our understanding that the pit has not experienced standing water in the past despite being situated in a low-lying area. Test pits indicated that there was no evidence of seasonal high groundwater within at least ten feet below the proposed elevation of the stormwater basin. Based upon the information presented for this specific site, it appears that the omission of an overflow system from the infiltration basin is an acceptable deviation from the standard.

   It is noted that the infiltration basin design calls for the installation of "loam and seed" in its bottom. The applicant should provide evidence that the proposed loam mix will provide for infiltration at a rate assumed by the stormwater report or shall consider an alternative surface treatment for the bottom of the basin that accomplishes this.

Additional Comments for Stormwater

Additional comments related to stormwater are provided below:

5. *Page 3-1*

The report indicates that TP-40 rainfall data was used for purposes of the proposed stormwater system analysis. This data source is acceptable for use based upon the current Massachusetts Stormwater Handbook. Notwithstanding its current regulatory status, this data source is outdated in comparison with other publicly available data sources including the Northeast Regional Climate Center (Cornell University) and NOAA Atlas 14. Furthermore, it is our understanding that the Massachusetts Department of Environmental Protection (MassDEP) intends to publish updates to its standards which will effectively retire the use of TP-40. We recommend that the applicant's engineer review these newer data sets and take them into consideration for purposes of design.

6. *Sheet D-2*

   The Standard Precast Concrete Catch Basin detail calls for a "LeBaron 'Snood' type or equal flip-up type hood". To the best of our knowledge this product does not exist. The applicant is asked to specify a hood that complies with MassDEP standards.

7. *Section 360-44 (B)(3): Discharge of stormwater shall be either into an existing, adequate storm system or the nearest natural watercourse.*

   The majority of the proposed development discharges stormwater to an infiltration basin within the site, not to an existing storm system or natural watercourse; however, we find the proposed infiltration system to be acceptable for the proposed layout in the definitive plan submission. (See the review related to Section 200-19, above.) The applicant should, however, note that the allowance of this approach may be problematic for future phases development that may add impervious surface and propose vulnerabilities that are not being considered under this review.

Hydrogeology

Review Standards for Hydrogeology

We reviewed the North Pole Estates Definitive Plan pursuant and limited to the following review standards for hydrogeology:

A. Ensure the submittal was prepared in accordance with accepted professional practices.

B. Ensure that all statements and conclusions related to hydrogeology in the Applicant's submittal including but not limited to the Applicant's Development Impact Statement accurately reflect the analysis and conclusions of the Hydrogeology Report.

General Discussion of Hydrogeology

According to the O'Reilly, Talbot & Okun (OTO) Hydrogeological Assessment Study (HAS), the approximately 115-acre Development (consisting of twelve contiguous tax parcels) at full buildout will consist of about 72 new homes, with each residence located on a 1 to approximately 2.3-acre parcel,

with a comprehensive coverage of about 85.5 acres. The remaining acreage of the Site will be developed for roads and stormwater retention features, and set-aside open space (e.g., wetlands, river shoreline). Each home will be developed with an individual septic system for domestic wastewater disposal purposes, and water service provided by the local public water supply (South Hadley Fire District 2). Currently, an approximately 30-acre, active sand and gravel quarry occupies the southern portion of the Site with a reported current finished bottom elevation of about 220 feet above mean sea level (ft amsl). As part of the proposed development activities, excavation and grading will be required. These activities will reportedly result in the excavation and removal of over 400,000 cubic yards of sand and gravel from the site.

The two public water supply wells which comprise the Dry Brook Wellfield are located about 500 feet north of the northernmost boundary of the Development Site, and about 1,200 feet north of the existing sand and gravel quarry. According to the available information, Wells 1 and 2 were installed circa 1963 and 2004, respectively, and were rated at the time of completion at corresponding yields of 980 gallons per minute (gpm) and 1,050 gpm. South Hadley Fire District No. 2 uses Wells 1 and 2 as alternate supplies, with the average system pumping rate ranging between 300 and 500 gpm, contingent upon demand. These wells derive groundwater from a sequence of primarily glacially deposited sand, and sand and gravel, that is may be locally overlain and underlain by low-permeability units of clay, silt, clay and silt, and till. Naturally occurring recharge to the aquifer is derived primarily from infiltrating precipitation and snowmelt runoff, though under significant pumping conditions from nearby wells (e.g., Well #'s 1 and 2), it may also be derived from the nearby Connecticut River by way of induced infiltration.

Based on the 2004 USGS study and driller logs for the Dry Brook Wells, they both tap the same sand and gravel unit which underlies the development site and that is currently part of the material being extracted at the on-site quarry. In the wellfield area, the unit is only about 20 feet thick and covered by close to 100 feet of low permeability clay with varying amounts of silt and fine sand (i.e., a confining layer), while the same unit exploited by the Dry Brook Wells is over 200-feet thick (where not already removed by quarrying) in the central portion of the Site (aka Dry Brook Hill), with no evidence of any hydrogeological significant confining layer.

Water quality information available for the South Hadley Fire District No. 2 public water supply indicate that the water pumped from both wells currently meets MassDEP drinking water standards. This condition combined with the ability of Wells 1 and 2 to meet the system demands, has been recognized and documented by South Hadley, the MassDEP, and the USGS. As such, a Water Supply Protection Overlay District (WSPOD), Wellhead Protection Area (WHPA) with corresponding Zones I and II, and Area of Contribution (USGS) have been delineated with respect to protect the Dry Brook Wellfield, with specific concerns have been noted to be directed towards the Dry Brook Hill area as: a significant source of recharge to the Dry Brook Wellfield; and an area requiring focus on maintaining compliance with the current drinking water quality standards and protection of the aquifer. Major activities and land uses associated with the Site and proposed Development that have been identified as being of potential concern to the Dry Brook Wellfield include sand and gravel quarrying and residential development that involves use of individual septic systems and on-site management of roadway (stormwater) runoff.

Review Findings for Hydrogeology

In reviewing the HAS, we focused on the adequacy and applicability of OTO comments and conclusions relative to the local hydrogeology, the current site-specific and proposed Development conditions, the MassDEP regulations and guidelines, and the concerns reflected by South Hadley. Based on our review of the HAS, the following, more relevant comments, and our responses are provided as follows:

1. The Zone II WHPA and WSPOD for the Dry Brook Wellfield, which were based on typical usage (300 gpm) and individual rated yield capacity (980 and 1,050 gpm, respectively), encompass a portion to most of the Site (Dry Brook Hill). Based on its review of the related USGS study, OTO indicates in the HAS that "the Dry Brook Hill area is important to the protection of the water quality in the Dry Brook Wells because the area contributes water to the wells under various simulated (i.e., pumping) conditions." With this said, the HAS acknowledges the significance of the Site in protection of the South Hadley Fire District No. 2 wells, yet only addresses the potential for impact from a former underground storage tank (UST) used to store #2 fuel oil at the quarry facility, and nitrogen loading from septic systems and road salt from de-icing activities as being potential sources of contamination related to the proposed Development. The HAS does not address the potential for impacts on groundwater quality which may result from other existing activities and land use associated with the proposed Development. A list of these activities and basis for concern are provided in the 2003 Source Water Assessment and Protection Program (2003 SWAP)[1] and include: fuel and oil spillage, and hazardous substances (e.g., antifreeze, degreasing solvents) associated with the operation and maintenance of quarrying equipment throughout the quarry area; and fertilizers, herbicides, cleaners, degreasers, and biosolids residuals associated with the use of domestic wastewater disposal activities. Furthermore, at the time of the SWAP's release, contaminants currently known to be related to domestic wastewater and found locally in groundwater supplies were not identified (i.e., emerging contaminants). The potential for the presence of these potential contamination concerns and measures to deal with these contaminants needs to be addressed for the HAS to be considered adequate. It should be noted, that planning board minutes from 2019 indicate that Chicopee had proposed the installation and sampling of monitor wells at the Site. To our knowledge, no monitoring wells have been installed. Given the hydrogeologic significance of the Site to the Dry Brook Wellfield, such measures should be considered.

2. The HAS acknowledges that the areal extent of the WHPA Zone II directly increases and decreases with pumping rate at the corresponding Dry Brook Wellfield. However, given the current use of these wells within a range of 300 to 500 gpm, the smaller area is assumed to be prevalent, which also means that the contributing amount of recharge is higher from the

[1] The 2003 SWAP can be downloaded from the following webpage: https://www.mass.gov/service-details/the-source-water-assessment-protection-swap-program

Site (i.e., recharge from the Connecticut River is minimal). This means that the proposed Development could have much larger impacts on water quality at the wells, because it would represent a significantly greater proportion of the area of contributing recharge. As such, evaluation of impacts associated with this change and the variety of potential contaminants needs to be addressed by the HAS in order for it to be considered adequate. Given that the thickness of aquifer materials at the Site is proposed to change with the proposed Development, the impact on the recharge contribution and mechanisms should be addressed by the HAS relative to the percentage of contribution to the Dry Brook Wells. The significance of such impact at lower pumping rates need to be addressed relative to the potential for a resulting shift in the amount of groundwater that may be derived from the Connecticut River.

3. According to the HAS, the proposed use of individual septic systems at the Development will meet the applicable Title V standards. It should be noted that the Title 5 standards are focused on nitrate as a contaminant of concern, and uses a generic approach which may be adequate for situations where the underlying groundwater resources are not being influenced by nearby public community supply wells which can affect the fate and transport of these contaminants. As discussed above, there are other contaminants besides nitrate (i.e., those listed in the SWAP) that the HAS needs to address as part of its assessment of the potential for the existing site conditions and proposed Development conditions to impact the Dry Brook Wells. This assessment should include projections of the long-term persistence of these contaminants and potential for travel through groundwater. In addition, the USGS study indicates that the pumping of the Dry Brook Wells does influence groundwater levels (i.e., drawdown observed at remote observation wells) in the sand and gravel aquifer unit underlying the Site (reported radius of influence of 2,300 feet). The distribution of groundwater levels measured at on-site wells by OTO as part of the HAS also corroborates that groundwater flow direction is naturally towards the Dry Brook Wells (no information regarding the status of pumping of these wells at the time of measurement is provided in the HAS). Based on these observations, OTO should be able to address the potential, and if applicable, travel time for such contaminants to reach the wellfield. Further discussion to the starting typical loading concentration of nitrate and concentration at the appropriate distance (e.g., dilution factor) relative to a resulting minimum increase at the Dry Brook Wellfield should also be addressed. Given the reliance on groundwater dilution to be a significant contributor to the in-situ decrease of nitrate and some other contaminants, a dilution factor approach should be provided. Such projections should be calculatable using simplified analytical techniques at a minimum, with a more detailed and robust approach being the use of a numerical model like the one developed by the USGS for South Hadley Fire District No. 2.

Additional Findings for Hydrogeology

We have no additional findings for hydrogeology under this review.

Transportation

Review Standards for Transportation

We reviewed the North Pole Estates Definitive Plan pursuant and limited to the following review standards for transportation:

A. Ensure the submittal was prepared in accordance with accepted professional practices.

B. Ensure the submittal appropriately assessed the adequacy of the existing and proposed roadways, the intersections of the existing and proposed roadways during and post construction—including, but not limited to, sight distances.

C. Ensure the submittal utilized current accepted study techniques and data and is consistent with the Preliminary Plan Approval.

Findings by Review Standard

Weston and Sampson reviewed the Traffic Impact Study for the North Pole Estates Residential Development that was prepared by McMahon Associates dated October 2019 for Chicopee Concrete Service, Inc. The study was prepared for the full development of the site which included 67 single family residences; however, as part of the definitive site plan submission the applicant is only seeking approval for a nine-lot subdivision with two full access driveways onto Hadley Street (Route 47).

The comments below are based on the full buildout of the site as presented. Where required the comments related to only the nine-lot subdivision have been noted separately. Our review of the traffic study consisted of two parts. The first part determined if the traffic study was prepared in general compliance with both local and nationally accepted standards. The second part determined if there were any concerns with portions of the study that required additional clarification or information from the Applicant in order to determine the operational capacity and safety aspects of the proposed project.

In addition, at the request of the Town, our review looked at the potential construction impacts associated with the proposed construction and material removal operations as these would represent an increase in traffic at the existing gravel operation driveway over the current conditions.

Under part one our review, we determined that the traffic study was prepared utilizing Massachusetts Department of Transportation Traffic Impact Assessment Guidelines and nationally accepted standards and would be acceptable for further review.

Under part two our review determined that there were several areas where there were inconsistencies or missing information that the Applicant would need to provide for us to complete a thorough review of the traffic study to determine that the results presented are acceptable. Below is a summary of the relevant issues that need further consideration by the applicant.

1. Under the Existing Traffic Volumes section, the study indicates that the morning peak hour occurs between 8:00-9:00 a.m. based on the volumes at the intersection of Sullivan Lane and Hadley Street. Sullivan Lane is a dead-end roadway with minimal traffic entering and

exiting from the Sullivan Lane during this time period and consequently less traffic entering and exiting from Pearl Street. However, our review of the traffic volumes show that the peak hour at Pearl Street is between 7:30-8:30 a.m. and results in more side street traffic entering and exiting from Pearl Street, including a number of left-turns out which have a greater impact on the overall operations of the intersection. Therefore, we would request that the applicant revise the analysis to utilize the 7:30-8:30 a.m. peak hour for the analysis as it may result in greater operational constraints, especially under the future conditions when additional site-generated traffic is added to the No-Build condition.

2. Under the Crash Summary section, the study indicates that the data reviewed was based on MassDOT data which may not include all of the relevant local data. Please clarify if the Applicant's engineer discussed local crash data with the South Hadley Police Department to determine if there is any additional local data that should be reviewed along this corridor. If not, then we recommend that Applicant's engineer reach out to the South Hadley Police Department to obtain local data and compare it to the MassDOT data.

   In addition, we would request that the crash data for the existing gravel operation driveway be reviewed since it is our understanding that it will be used during construction for material removal operations.

   Lastly, the MassDOT crash rate worksheets are mentioned, but copies have not been provided as part of the study or appendix for review. Please provide copies of the crash rate worksheets for review.

3. Under the Site-Generated section there is an error in Table 2 whereby the Weekday PM Inbound traffic is shown as 44 trips instead of 43 trips as shown in the Appendix. This also results in an incorrect total amount of trips. We do not believe this error will result in a change in the overall operational results and is noted for reference should the Applicant's engineer be required to revise the study to address other issues noted in this review.

4. Under the Trip Distribution section, a large percentage of traffic was shown going to/from the site from the south on Hadley Street (Rte 47). The study indicates that this distribution was based on a review of the 2010 Census journey to work data. Since this data is almost 10 years old please clarify if any consideration was given to reviewing existing travel patterns along Hadley Street and adjusting the volumes to show more volume to/from the site from the north along Hadley Street as seen at the intersection of Hadley Street and Pearl Street.

5. The Traffic Operational Analysis section indicates that the capacity analysis was based on the 2010 Highway Capacity Manual (HCM), however the Appendix indicates that the study was based on the 6th Edition of the Highway Capacity Manual. Please clarify which version of the HCM was used to prepare the Synchro Analysis.

6. The Synchro Analysis provided in the Appendix utilizes the Peak Hour Factors (PHF) shown in the count data for the main line roadway, but a default PHF of 0.80 for the side streets under the existing conditions which does not correspond to the count data. Under the future conditions, the PHF from the count data was utilized for the main line roadway and a default PHF of 0.80 was utilized for the side streets which does not correspond to the count data. Please clarify why there is this inconsistency as MassDOT recommends using the approach PHF shown in the count data for the existing conditions and a 0.92 PHF for main line and a 0.88 PHF for side streets under the future conditions. Please explain why the values presented in the Synchro analysis were utilized.

7. Under the Sight Distance section, the Applicant's engineer failed to provide a review of the intersection sight distance at the proposed driveways as required in the MassDOT TIA guidelines. During our field review it was noted that numerous trees and grading along the roadway appear to restrict the available intersection sight distance. Therefore, we request that the Applicant's engineer provide sight line profiles for the two proposed driveways for review. In addition, the driveway to the proposed single-family residence on Lot 8 shall also be included in the sight distance analysis for this project as it is a new access point to Hadley Street.

   For all driveway the intersection sight distances should include a proposed 2-foot-high snowbank along the edge of the paved shoulder to simulate winter conditions as required by the Planning Board as part of their April 29, 2019 Preliminary Plans approval.

8. In addition, we request that the Applicant's engineer provide a review of both the stopping sight distance and intersection sight distance for the existing gravel operation as it was noted that this driveway will be used for material removal operations. It is assumed that this results in an increased rate of truck traffic over what utilizes this driveway under the current conditions. The Applicant shall provide a description of the anticipated increase in truck traffic required for the material removal under this first phase for review

   During our site review two vehicles were observed utilizing the existing gravel operation driveway, a triaxle dump truck making a right turn into the site and a tractor trailer dump truck making a right turn out of the site. Both of these vehicles crossed the centerline of the roadway to complete their turning maneuvers. This Therefore, we request that the Applicant's engineer provide a turning movement analysis at the existing driveway using tractor trailer dump trucks to determine if these maneuvers can be made safely from the driveway with no encroachment into the opposing travel lane.

Additional Comments

Overall the study appears to show that even with the requested changes and clarifications noted above, that the operations of the two proposed driveway intersections are acceptable and the operations of the existing roadway intersections are not anticipated to be adversely affected by

the proposed full build out of the 67 lot subdivision. Therefore, it can be concluded that the proposed nine lot subdivisions will not have a significant operational impact on area roadways and intersections.

However the Applicant still needs to provide additional information on intersection sight lines at the two proposed site driveways and both the stopping sight and intersection sight distances for the driveway to the proposed single family residence to ensure that the safety of the intersections can be maintained. Final approval of the traffic study will depend on satisfactory review of the additional information requested including the operations and safety of the existing gravel operation driveway.

Definitive Plan Review

Review Standards for the Definitive Plan

We reviewed the North Pole Estates Definitive Plan pursuant and limited to the following review standards for definitive plans:

A. Ensure the submittal was prepared in accordance with accepted professional practices.

B. Ensure the submittal was prepared in accordance with the South Hadley Subdivision Regulations (Chapter 360 of the Town's Bylaws).

C. Ensure the submittal conforms to the South Hadley Zoning Bylaw provisions applicable to the subject property.

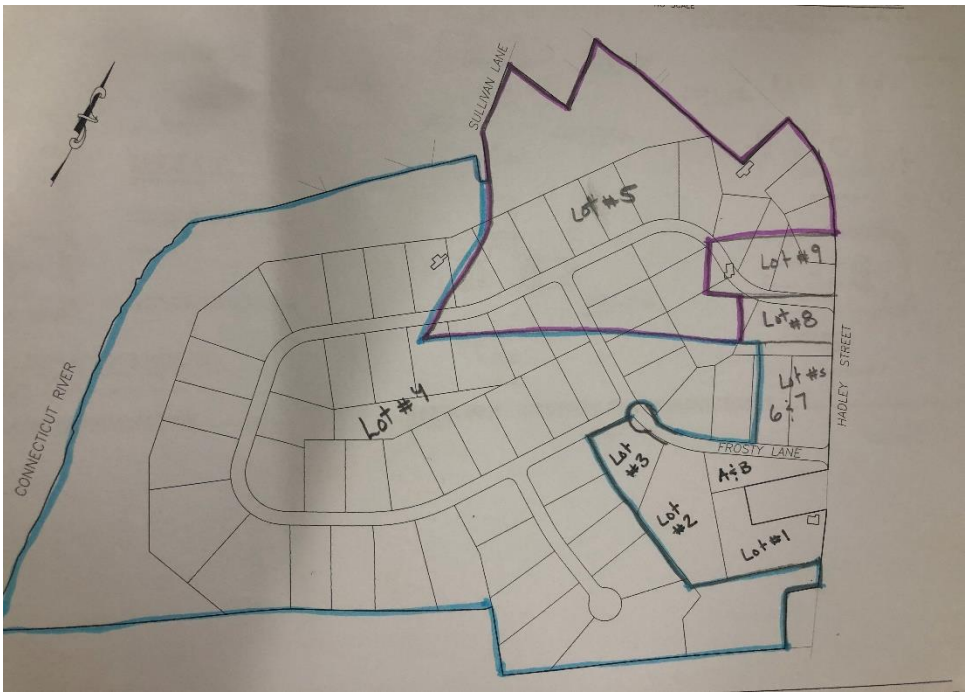
D. Ensure the submittal reflects conformity with the conditions attached to the Preliminary Plan Decision.

Review Findings for the Definitive Plan

We reviewed the applicants Definitive Plan submission and find that it to be prepared in conformance with the review requirements except as provided below:

1. Was the application prepared in accordance with the South Hadley Subdivision Regulations, i.e., Chapter 360 of the Town's Bylaws

Generally, we find that the Definitive Plans were prepared in accordance with Chapter 360 of the Town's Bylaws; however, we did find inconsistency between the layout dimensions of the Preliminary Plan and the Definitive Plan. The Definitive Plans depict lots 1 through 9, with lots 4 and 5 containing the bulk of the land that would eventually be the remainder of the proposed 67 lots. Many of the lot lines shown for initial lots 1-9 do not coincide with any lot lines for future phases. See the hand-drawn graphic below:



The applicant does not provide a comparison of the lot layout that was proposed for the approved preliminary plan and the lot layout that was proposed for the proposed definitive plan, but there appear to be discrepancies. The drawing above shows the approximate location of lots lines for lots 4, 5, 8 and 9. Those lines do not appear to coincide with future development lots as depicted. This calls into question the validity of lots 4, 5, 8 and 9 as they do not seem to coincide with lot lines for future development. To address this issue, we recommend that the Town request a phasing plan from the applicant that clarifies why lots 4, 5, 8 and 9 are being created as depicted. We anticipate that future phases will require either redrawing or amendment of the lot lines. This also raises a question related to the ultimate ownership of areas in lots 4 and 5 that are not part of the depicted full-build layout. We recommend that the Town ask for a clarification of this issue.

2. <u>Conform to the South Hadley Zoning Bylaw provisions applicable to the subject property Agricultural Zoning Definition per Section 255-11.E</u> *The purpose of this district is to promote*

agriculture, forestry, recreation, and land conservation, as well as compatible open space and rural uses, by siting development in a manner that preserves large contiguous tracts of open space and agricultural land. The preservation of scenic vistas of open land, forestland, the Mount Holyoke Range, the Mount Tom Range, and the Connecticut River in this district is a key aspect of maintaining South Hadley's desired scenic and rural identity.

In our opinion, the excavation of this site to match grade at the bottom of the extraction pit does not meet the definition of the purpose of the district. The proposed approach to grading does not promote agriculture, forestry, recreation, or land conservation. The proposed excavation appears to remove active agricultural fields, cut down a large forested area, and does not allow for recreation or land conservation. The project does not appear to site development in a manner that preserves large contiguous tracts of open space or agricultural land. We recommend that the Town ask for an evaluation of alternative approaches to grading that would better address the purpose of agricultural zoning at the project site.

3. Water Supply Protection District Section 255-35(1)(b) *Upon completion of earth removal operations, all altered areas shall be restored with topsoil and vegetative plantings.*

The applicant is quoted in the minutes of the November 18, 2019 meeting as saying "…replanting of individual lots would be up to the individual owners and street trees would be planted as required." At a minimum, we recommend that the current limits of the gravel operation be required to adhere to the topsoil and revegetation requirements of 255-35(1)(b). If part of the responsibility is passed from the applicant to future owners, we recommend that the Town reserve the option or review and approving proposed covenants to ensure they meet the Town's needs.

4. Of particular interest regarding Outcome/Result #3 (i.e., in relation Section 255-35(1)(b)) above, the Town expects the Peer Reviewer to advise on the following questions:

- ***a.*** *Whether the plans depict earth removal that is "incidental to and in connection with" development of site improvements necessary for the proposed North Pole Estates subdivision (per Section 255-84A(2) of the South Hadley Zoning Bylaw).*
- ***b.*** *Could changes in the proposed grade of the proposed street "Frosty Lane" as depicted in the Definitive Plan reasonably reduce the scope of the proposed Earth Removal while also conforming to the requirements for a roadway's maximum and minimum grades as specified in the South Hadley Subdivision Regulations?*
- ***c.*** *Does the proposed extent of earth removal appear to go beyond what is necessary to install the necessary proposed "site improvements for" North Pole Estates?*

In answer to item 4b above, we believe that there are alternatives to the proposed grade of "Frosty Lane" that could reduce the scope of the proposed earth removal. Maximum allowable

grades for Type A subdivision roads are 9 percent, and the proposed roadway is below this maximum in all locations.

We are unable to provide comment for Items 4a and 4c without additional information. These topics were discussed at our site visit with the applicant's engineer on February 24, 2020. It is our understanding that the applicant's intent in re-grading the site is to create a smooth transition from Hadley Street into the grades at or near the bottom of the current sand and gravel extraction pit. This approach will result in the export of a significant quantity of material. While we recognize that this is one way to create a gently sloping site, we recognize that there may be other methods of evening the grade including use a cut-and-fill approach with the material on the site or importing material to the site. An example of one such alternative could involve filling in a portion of the low-lying sand pit area to the west by utilizing material excavated for the construction of Frosty Lane and/or the grading of lots closest to Hadley Street. The feasibility of this or other alternate approaches may be contingent upon other design factors, but these have not been identified by the applicant. We find that the applicant's proposed approach may not comply with the spirit or requirements of the Town's Agricultural Zone, Section 255-11, which overlays the proposed project site. (See Definitive Plan Review Item 2, above.) We recommend that the Town require the applicant to provide an evaluation of the current design approach relative to other alternatives to help the town determine whether the current design approach strikes an acceptable balance between project feasibility and the interests of the Town's Agricultural Zone.

4. *Reflect conformity with the conditions attached to the Preliminary Plan Decision*

Below we provide a listing of preliminary plan conditions and our findings related to them.

a. *Conformance to Regulations. The applicant shall conform to all applicable provisions of the Subdivision Regulations of the Town of South Hadley (including but not limited to, use of the Town's application form or an exact reproduction of said form), unless the Planning Board expressly waives any such provision as a condition of a Definitive Plan approval. The Planning Board, at this time, has not approved any waivers applicable to the Definitive Plan submittal.*

   It is unclear why the site plan has changed from the Preliminary approval. We recommend that the Town ask the applicant for clarification on this issue.

b. *Riverfront Delineation. The Riverfront Boundary is shown as "approximate." The applicant needs to have a formal delineation undertaken to ensure that no work is undertaken which would impact the Riverfront jurisdiction.*

   The plans submitted dated January 20, 2020 show the riverfront boundary as "approximate." It appears no formal delineation was provided, and this condition was not satisfied. We recommend that the Town request clarification on the applicant's intent.

c. *Limit on Grading. Limit grading of area in proximity to the Riverfront Boundary (as it is eventually delineated) and the other wetland areas to ensure that destabilization of trees and drainage*

systems don't have the long-term effect of damaging the Riverfront or wetland Resource areas.

The only areas shown on the grading and erosion and sediment control plans are in the area of the roadway. Proposed grading for the entire site should be shown to fully understand and evaluate how future phases of the subdivision will impact wetlands, groundwater, stormwater, and the river. We recommend that the Town request clarification on the applicant's intent.

d. *Topography. The topography depicted on the Preliminary Plan appears to be generalized and interpolated. Due to the amount of grading anticipated, the topography must be verified.*

It is not clear whether this issue has been resolved. To our knowledge, the need for the extent of grading at the proposed project site has yet to be evaluated by the applicant. We recommend that the Town require a direct response to this concern prior to approval.

e. *Groundwater Elevation. Verification of the "historical seasonal high groundwater" to ensure that the finished elevations will allow sufficient space for Stormwater detention, septic tanks, and building foundations not to be within 5 feet of the "seasonal high groundwater."*

Our findings and recommendations are provided under the hydrogeological review.

f. *Traffic Analysis. Traffic analysis to include a determination of impact on the existing traffic patterns and flows on Hadley Street, Sullivan Lane, and Pearl Street. This analysis should include a sight distance analysis—particularly for peak periods and taking into consideration winter conditions.*

Our findings and recommendations are provided under the transportation review.

g. *Construction Staging/Operation Planning. A plan for ensuring that construction equipment and operations do not adversely impact the groundwater supply. This should include an Operations & Maintenance Plan and Emergency Response Plan that establishes a specific location for maintenance of equipment and their storage when they are not in use on the site.*

The Definitive Subdivision Plan for North Pole Estates does not appear to show construction staging or operations and, therefore, we are unable to review them for adequacy of groundwater protection. The applicant's Operation and Maintenance Plan makes reference to an "equipment location" but does not appear to indicate a proposed location or to provide for facilities such solid waste disposal and containment, hazardous materials storage, equipment refueling, or equipment washing. We recommend that the Town require the applicant address this item prior to approval.

h. *Vegetative Maintenance. Mature trees can benefit the environment and homeowners in many ways. Accordingly, the developer should seek to minimize removal of trees from the site as one of the approaches to managing erosion. The phasing plan for the development needs to include a phasing plan for tree cutting to prevent destabilization of the extreme slopes*

throughout the entire site, and to prevent the proposed stormwater basins from being overwhelmed during the construction phase.

The applicant's materials do not appear to address phasing, vegetation maintenance, minimization of tree removal, or management of erosion on steep slopes. We recommend that the Town require the applicant address this item prior to approval.

i. *Revegetation Plan. The site has been subject to a significant amount of disturbance and the proposed Preliminary Plan suggests significant additional disturbance (such as removal of most of the sites' vegetation and top soil, excavation of most of the site, etc.) will be part of the development of this subdivision. The disturbance could result in long term degradation of the site including "steep" slopes which could render lots effectively unbuildable. Therefore, to ensure that the site remains stabilized, the applicant needs to provide a plan for restoration of the gravel pit, including grading, replacement of topsoil, and re-vegetation along with a time schedule for implementation. This timetable must provide that revegetation occurs as part of the process of constructing the infrastructure as well as post construction. Therefore, the applicant is to include with the Definitive Plan submittal, a plan including narrative description for the revegetation during both phases of the project: 1) interim phase which details restoration/landscaping during construction and 2) final phase, post construction. The post infrastructure construction phase must incorporate the street trees and other landscape planting required under the Subdivision Regulations.*

A timetable is submitted that indicates the task of "Landscape, Loam and Seed Affected Areas" will take 2 weeks. We did not find any further detail on how this condition will be met. We recommend that the Town request clarification on the applicant's intent.

9. *Fill Material. Details on how any fill material will be verified that it is not contaminated.*

We did not find a discussion on how this condition will be met. We recommend that the Town request clarification on the applicant's intent.

10. *Buyer Notification. The Water Supply Protection District has unique restrictions applicable to all property owners (particularly important for single-family homeowners) which do not apply to all properties in South Hadley. Adherence to these restrictions (such as on pesticides, fertilizers, application of materials to melt ice, etc.) is particularly important to protect the water quality in a Water Supply Resource Areas Zone II. Accordingly, the applicant is to provide details on how lot purchasers will be informed that they are in a Zone II area.*

We did not find any further detail on how this condition will be met. We recommend that the Town request clarification on the applicant's intent.

11. *Hydrogeological Assessment Study. The purpose of the Water Supply Protection District is to promote the health, safety and welfare of the community by protecting and preserving the surface and groundwater resources of the Town and the region from any use of land or buildings which may reduce the quality and quantity of its water resources. As such,*

excavation of a substantial amount of material and construction of a substantial number of houses in the Zone II could have an adverse impact on the health and safety of the residents and impede the ability of the District to continue to supply public water. Therefore, a Hydrogeological Assessment Study demonstrating that the proposed development will not have an adverse impact on the District 2 Public Water Supply, health and safety is to be provided by the applicant.

Comments are provided under the hydrogeologic review section of this letter report.

12. *Earth Removal Details. Details on the earth removal, particularly any proposed crushing operation to be carried out on site.*

    We found a limited discussion of earth removal on page 21 of 30. None of the practices listed discuss proposed crushing on the site. We found no further detail on how this condition will be met. We recommend that the Town request clarification on the applicant's intent.

13. *Pavement. The Planning Board is supportive of minimizing the extent of pavement to be provided in this subdivision. Further, South Hadley's Stormwater Management Bylaw and policies in the Master Plan encourage minimizing impervious surfaces and use of Low Impact Development approaches. Given the important significance of the Zone II of the Dry Brook Hill Water Supply, such approaches are more significant in this area and are encouraged to be incorporated into the Definitive Plan.*

    Comments are provided under the stormwater review section of this letter report.

14. *Prior Contamination. The site has been traveled over, for decades, by trucks and heavy equipment. It has been used at times as a shooting range. Accordingly, the Definitive Plan submittal needs to address how the applicant plans to test the site for the presence of contaminants and mitigate any such contaminants found to be on the site.*

    Our review of the applicant materials provided found no testing the site for the presence of contaminants or how any such contaminates would be mitigated. The Operation and Maintenance plan identifies how potential site contamination related to construction would be addressed and does not discuss testing or mitigation of previous contamination. We did not find any further detail on how this condition will be met. We recommend that the Town request clarification on the applicant's intent.

15. *Special Permitting for particular lots. As proposed, lots 13 through 28 are in proximity to either Buffer Zone or Riverfront which are significant environmental resources. The applicant is encouraged to avoid these areas to lessen the potential impact on these resource areas. If the Definitive Plan includes creation of these or other lots within the same or similar proximity to these areas, as stated in the Conservation Commission's letter, lots will require special permitting by the Conservation Commission due to the proposed lots proximity to either Buffer Zone or Riverfront Area:*

a. Proposed lots 19 thru 28 along the northern boundary of the site are within Buffer Zone and as such will require the filing of a Notice of Intent for any work on those lots.

b. A formal delineation of the Riverfront Resource Area will be required relative to proposed lots 13 thru 19 are proximal to an area notes on the plan as "200' Riverfront Area Approximate". Additional permitting through the Conservation Commission is likely to be required for the resulting lots.

c. The Conservation Commission plans to review each proposed lot as specific development plans are generated to consider the extent to which building activities are jurisdictional to the Commission based on bylaws in place at the time of development.

d. where a proposed lot includes a portion of a Resource Area, the applicant is encouraged to depict building footprints for each lot to indicate that there is reasonable area in which to locate residential buildings thereon without request either a variance from the Zoning Bylaw or a waiver from the Wetland Bylaw. Again, the applicant is encouraged to consult with the Conservation Commission regarding the Wetlands Bylaw prior to submittal of a Definitive Plan.

Definitive plans submitted do not identify any lot locations beyond initial lots 1-9. Because the Preliminary plan is considerably different than Definitive plans submitted, it is impossible to determine if any of the above information will be satisfied. We did not find any further detail on how this condition will be met. We recommend that the Town request clarification on the applicant's intent.

16. *Peer Review Anticipated. Based on the plans submitted and the input provided to date, the applicant should anticipate that the Town will likely seek to have peer reviews conducted on at least the following aspects of the Definitive Plan: Riverfront Resource Area delineation; Stormwater Management Plan; Hydrogeologic Assessment Study; Operation, Management, and Emergency Response; and Traffic Impact.*

    We have no comments related to this condition.

17. *Waivers. The only waivers requested in the Preliminary Plan submittal were regarding the scales for the Plan and Profiles. The Board has allowed the Preliminary Plans to be reviewed and conditionally approved using the scales shown on the plans as submitted. As such, the Planning Board has granted the waiver regarding the scales for the plans and profiles for the Preliminary Plan. HOWEVER, this waiver does NOT extend to the Definitive Plan. Therefore the Planning Board's conditional approval of the Preliminary Plan do not convey any waiver applicable to the Definitive Plan submittal.*

    We have conducted a review in accordance with our contract with the Town, which includes specific standards for review. Our review does not address waivers. We recommend that the Town confirm that no further review is required under this item.

18. *Peer Review. The comments from the Peer Review Letter submitted by Berkshire Design dated April 29, 2019 are to be addressed and resolved in the Definitive Plan submittal.*

a. Lots 9-18 do not appear accessible due to proposed steep grades.

Lot 9-18 on the Preliminary plan cannot be compared with those on the Definitive plan. Preliminary plans show the entire subdivision layout with topography and lot 9-18 have significant slope along the frontage of the lots. Definitive plan design elements of roadway design, roadway location, stormwater design, and subdivision layout only show the initial 9 lots proposed. Lot 9 on the Preliminary plan is in a different location than on the Definitive plan. The Definitive plan has no lots beyond #9 labeled. We recommend that the Town request clarification on the applicant's intent.

b. The proposed drainage easement "to be acquired" on the lots N/F Peter Edge is not labeled as to width and appears to be very narrow. The project cannot function as designed without the easement and the easement should be wide enough to install and maintain the storm drainage pipes.

The Preliminary plans cannot be compared with the Definitive plans to determine if this has been satisfied. Preliminary plans show an underdetermined width storm drain easement. Definitive plans submitted vary significantly in design and no direct comparison can be made. Definitive plans do not show a drainage easement in the area shown fronting on Hadley Street. We recommend that the Town request clarification on the applicant's intent.

c. The proposed project will require extensive clearing and excavation of over 50 feet in some areas. A phasing plan should be provided that assure adequate loam and plantings are provided to stabilize the site.

We did not find a detailed phasing plan that assures adequate loam and plantings would be provided to stabilize the site. We did not find any further detail on how this condition will be met. We recommend that the Town request clarification on the applicant's intent.

19. *Roadway Maintenance. The proposed roadway is to be maintained by the developer until such times as the roadway becomes a public road (this is not to be interrupted as committing the Town to ever accepting the roadway as a public road). This maintenance task includes, but is not limited to, maintaining the safe roadway surface, snow removal, etc. Maintaining access of a roadway free of snow and ice in a Zone II Water Supply Recharge Area requires special considerations. Accordingly, the Definitive Plan submittal needs to provide a plan for maintaining the proposed roadway consistent with DEP requirements, best practices given the environmental conditions, and Section 255-35E and Section 255-35F of the Zoning Bylaw with particular attention to 255-35E(8) regarding stockpiling of snow and 255-35F(2) regarding minimal use of sodium chloride for ice control.*

    Page 13 of the Hydrogeological Assessment Study briefly discusses the proposed roadways. We did not find any further detail on how this condition will be met. We recommend that the Town request clarification on the applicant's intent.

20. *Department Comments. Review of the Preliminary Plan by the Town Departments generated comments/reviews from the following departments:*

    a) April 29, 2019 email from Mark Aiken, Fire District #2 – Water Superintendent

    b) April 29, 2019 Letter from the Conservation Commission

    c) April 24, 2019 email from Fire District #2 Fire Chief Scott Brady

    d) April 24, 2019 email from Police Chief Jennifer Gunderson

    e) April 18, 2019 Letter from the Fire District #2 – Board of Water Commissioners

    f) April 29, 2019 Letter from Berkshire Design transmitting their Peer Review

    Comments from most of the departments are of a nature that they should, to the extent possible, be addressed and resolved during the course of preparing the Definitive Plan prior to Planning Board action on any such Definitive Plan.

21. *Application Materials and Revisions Incorporated. All application materials (including subsequent revisions thereto) submitted to, and received by the Planning Board as part of the applicant's "Form B – Application for Approval of a Preliminary Plan" received by the Town Clerk on March 28, 2019 are hereby incorporated into and made part of this Decision. Furthermore, related materials are also hereby incorporated into and made part of this Decision. Said application and related materials specifically include, but are not limited to, the following…*

    We have no comments related to this condition.

Additional Comments

59 of 131 indicates that 23 acres of "open space" will be provided along the Connecticut River. This area is not shown as open space on any of the plan sheets. Is this area the 200' riverbank setback? That area should not qualify as open space. Where is the 23 acres located?

61 of 131 indicates "landscaping will be consistent with that of other single-family homes." What does that mean? What "other" single-family homes?

Preliminary plans have basic details regarding entire site construction. They show approximate lot locations, the location of all proposed future roadways and proposed stormwater management for the entirety of the property. The Definitive plan submission is significantly different. No specific details are shown for the property and the initial lots 1-9 that are shown are not the same as the Preliminary plans. It is impossible to determine how the changes of Definitive plan lots 1-9 relate to future development plans as the design will have to change in order to accommodate the considerably different layout proposed.

A member of the public questioned how many trees would be removed.at the November 18, 2019 minutes and the applicant states "…he would quantify the amount of proposed clearing." To our knowledge, this information has yet to be provided by the applicant.

Thank you for the opportunity to assist the Town of South Hadley with this review. If you should have questions related to this review, please contact me at 978-977-0110, ext. 7413 or by email at riordanj@wseinc.com.