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Mr. Bob Gambale, Chair
Zoning Board of Appeals
Town of Ipswich
25 Green Street
Ipswich, MA 01938

September 11, 2018

Attn: Marie Rodgers

Ref. T0801

Re: Comprehensive Permit Application
Traffic and Civil Engineering Peer Review

Dear Mr. Gambale and Zoning Board Members:

On behalf of the Town of Ipswich, TEC, Inc. reviewed documents as part of the traffic and civil engineering peer review for the proposed project located on an undeveloped lot on Essex Road (Route 133) (Map 54A, Parcel 14A and Map 54C, Parcels 22, 22A, 23, 24). The project consists of constructing 20 townhouse units and 174 apartment units along the north side of Essex Road, approximately opposite the intersection with Ruths Way. Access to the project consists of two full-movement access driveway intersections onto Essex Road.

The following documents were received as part of our review:

- *Traffic Impact and Access Study*, prepared by Bayside Engineering, Inc., dated February 21, 2017;
- *Memorandum for Essex Pastures*, prepared by Bayside Engineering, Inc., dated July 9, 2018;
- *Memorandum for Essex Pastures – Lakemans Lane*, prepared by Bayside Engineering, Inc., dated August 22, 2018;
- *Plan set*, prepared by Bayside Engineering, Inc., dated August 9, 2018;
- *Essex Pastures Site Development Stormwater Report*, prepared by Bayside Engineering, Inc. date August 9, 2018;

TEC completed a review of these documents for the Town of Ipswich, and the following provides a summary of the comments compiled during our review:

Transportation Impact Evaluation

1. The Traffic Impact and Access Study (TIAS) and the updated memorandum (July 9 Memo) present a study area along Essex Road (Route 133) including County Road (Route 1A) to the west and Heartbreak Road to the east. The second memorandum (Lakeman's Memo) expands the study area to include the intersections of Lakeman's Lane with Essex Road and County

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Road. TEC concurs with the scope of the expanded study area and does not find that additional intersections are warranted based upon the documented trip generation levels.

2. Traffic counts utilized within the three traffic reports were conducted in June 2015 and August 2018. The July 9 Memo indicates that the June 2015 counts were increased 6% to a seasonal peak. The Lakeman's Memo indicates that the August 2018 volumes remained unadjusted as August represents the seasonal peak condition. The Applicant conducted automatic traffic recorder counts along the site frontage in June of 2015, April 2018, and August 2018. The April 2018 and August 2018 daily traffic volumes along Essex Road are approximately 5% less than the June 2015 daily traffic volumes. Therefore, the June 2015 counts used in the TIAS and July 9 Memo are conservative for analysis.

TEC notes that the June 2015 counts are not within the two-year time frame required by MassDOT within their *TIA Guidelines*. MassDOT may require new traffic counts be performed upon submission of an Application for Permit to Access State Highway.

The weekday morning and weekday evening peak commuter hours were studied to determine the project's overall effect on the roadway. TEC concurs that these selected time periods are appropriate for a residential land use as the peak hours of the dwelling units will typically overlap with the peak hours of the adjacent street system.

3. To properly assess roadway operations and safety, including sight distance, the Applicant utilized a conservative 85th percentile travel speed along Essex Road (45 mph westbound and 47 mph eastbound) instead of the posted speed limit of 35 mph along the site frontage. These travel speeds were measured by the automatic traffic recorders in June 2015. TEC concurs with this speed assessment.
4. The Applicant utilized an annual traffic volume growth adjustment factor of 1.0 percent per year based on data provided by MassDOT. The TIAS concurrently overlaid projected traffic volumes associated with the redevelopment of the former O'Keefe automobile dealership site on County Road as this site was not operational at the time of the 2015 counts. TEC concurs with the use of these traffic volumes and adjustment factors based on the MassDOT *TIA Guidelines*.
5. The TIAS presents motor vehicle crash data for each of the study area intersections. The crash data indicates the number, type, and severity of crashes at the study area intersections between 2010 and 2014. Upon review of MassDOT's online crash portal, some crashes, although limited, may not be represented in the TIAS for intersections in the study area. The Applicant should review the crash data for the study area intersections and update as necessary; including the potential to include 2015 and 2016 data which is currently available from MassDOT. TEC also requests that a crash analysis be conducted for the expanded study area intersections of Lakeman's Lane / Essex Road and Lakeman's Lane / County Road.
6. Upon review of MassDOT's online crash portal and the data provided, TEC concurs that an identifiable crash issue and/or trend does not exist at the study area intersections. Although a specific crash trend does not exist, the Applicant should provide documentation of other traffic safety related issues/deficiencies at the intersections and subject roadways, if applicable.

7. The TIAS uses the standard fitted curve equations published in the ITE publication *Trip Generation, 9th Edition* for land use code (LUC) 220 – Apartment to estimate the traffic generated by the 194 apartment and townhouse units. The July 9 Memo updates the traffic generation projection using the ITE publication *Trip Generation, 10th Edition* for land use code (LUC) 221 – Multifamily Housing (Mid-Rise), reducing the traffic generation projections for the proposed site by 30%. Because the proposed development is on the lower side of the ITE Mid-Rise Multifamily Housing height spectrum (3-10 floors is considered Mid-Rise), does not have direct access to public transportation, and partially consists of townhouse units; the Applicant should revise the trip generation estimates to use the ITE publication *Trip Generation, 10th Edition* for land use code (LUC) 220 – Multifamily Housing (Low-Rise), which may reflect the traffic anticipated to be generated by the subject site more accurately.

For the purposes of determining the proposed project's impact on the immediately adjacent Essex Road roadway system and the improvements necessary to mitigate any impact, the analyses within the original TIAS remain the most conservative. The analyses within the Lakeman's Memo are appropriate to provide a sensitivity analysis for any potential cut-through traffic on this residential roadway.

8. The vehicular traffic generated by the proposed project was distributed onto the adjacent roadway system based upon available Journey-to-Work data published by the US Census Bureau for persons residing in the Town of Ipswich. This form of trip distribution is consistent with industry standards for residential developments, and therefore, TEC concurs with the methodology.

TEC notes that a portion of the site generated traffic (27%) is distributed to the east via Essex Road. The volumes are shown in the Site Generated Trip Figures 7 and 8 in the TIAS and the July 9 Memo. However, these volumes are not carried through the intersection of Essex Road / Lakeman's Lane in the Lakeman's Memo. The Applicant should review the site distributions and revise the analyses at the intersection of Essex Road / Lakeman's Lane as necessary.

9. TEC generally concurs with the results of the capacity and queue analysis provided as part of the TIAS utilizing the Highway Capacity Manual 2010 (HCM 2010) methodology.
10. Overall, TEC concurs that the general impact of the project on the control delay, queue, and level of service along the approaches to the study area intersections is anticipated to be nominal in terms of 'vehicular' traffic.
11. The Lakeman's Memo performed a sensitivity analysis of the operation of the intersections of Lakeman's Lane with Essex Road and County Road should up to 50% of the site traffic to/from the south on County Road (Route 1A) use this roadway as a cut-through. TEC performed travel time runs on the two routes to the site – via Lakeman's Lane and via County Road. TEC concurs with the findings within the Lakeman's Memo that the average time to/from the site via Lakeman's Lane is approximately one minute longer than the route via County Road. The two intersections studied continue to operate at acceptable levels of service within the sensitivity analysis with the addition of site generated traffic.
12. The Applicant proposes to monitor the operations of the Essex Road / County Road intersection 12 and 24 months after full occupancy of the development and commits to providing design plans for the signalization of the intersection if the intersection level of service is poor due to

the subject project traffic. TEC recommends that the Board consider the monitoring program as a condition of approval. At a minimum, the monitoring program should include daily and peak hour traffic volume counts at the site driveways to confirm traffic generation of the site and the peak hour operations of the intersections of Essex Road / County Road and Essex Road / Lakeman's Lane. Alternatively, the Applicant should coordinate with the Town's DPW for a scaled contribution to current or future infrastructure improvements near the project site to account for the project's tertiary impacts.

13. The sight distances reported in Table 10 of the TIAS are measured in accordance with the American Association of State Highway and Transportation Officials (AASHTO) requirements and correspond with measurements TEC performed in the field. It is TEC's understanding that 12 feet of the existing retail building at #34 Essex Road will be removed to provide adequate sight distances at the intersection of the West Site Driveway / Essex Road. The site plans should be revised to show this building removal and any sight lines along the property frontage along Essex Road. The Applicant shall provide a plan within the set that depicts the AASHTO minimum sight distance to/from each of the new access driveways onto Essex Road. The sight line clear areas should be compared against future proposed Landscaping Plans to confirm that the sight lines will remain clear as reported in the traffic study. The Applicant should commit to remove and maintain vegetation along the site frontage consistently to ensure that sight lines remain unobstructed at the site driveway intersections with Essex Road.
14. Access to the project is proposed via two full movement driveways onto Essex Road. The West Site Driveway is in the approximate location of the existing driveway into #28 Essex Road, and the East Driveway is a new driveway located east of the Bruni Market Place. Due to the roadway speed, the applicant should consider the implementation of left turn lanes along Essex Road to remove these conflicting movements from the through traffic along the roadway. MassDOT has exclusive jurisdiction over all curb cuts that intersect with State Highway Layout (SHLO). TEC recommends the Applicant and the Town discuss the sight distances proposed at the West Site Driveway and the provision of left turn lanes at both site driveways with MassDOT's District 4 office as part of the Application for Permit to Access State Highway.

The Town should consider including a condition to any approval of the site plan requiring completion of an approved MassDOT Permit to Access State Highway prior to the issuance of a Building Permit.
15. As provided, the Site Layout Plan depicts an on-site sidewalk network along one side of each access driveway and throughout the parking areas. The on-site sidewalk connects with the existing sidewalk along the north side of Essex Road. The Applicant should consider, if possible, the construction of sidewalk along both sides of each access road within the development. A crosswalk should be added within the parking area between the two buildings on the southeast corner of the site. The Applicant should provide further detail on the plan to the location and type of accessible ramps within the site and at the site driveway crossings along Essex Road. Details for each ramp configuration type and crosswalk type and material should be added to the Site Development Plans.
16. The Site Development Plans should depict any proposed accommodations for a school bus pick-up and drop-off location along the site frontage. This could include some sections of new

granite curbing and a cement concrete sidewalk surface to provide a visual difference for the pedestrian space adjacent to internal circulation areas.

17. The Town of Ipswich Zoning Bylaw requires 1.5 parking spaces per dwelling unit. For the 20 townhouse units, each unit appears to have two parking spaces – one garage space and one driveway space. For the 174 apartment units, 266 parking spaces are provided at a ratio of 1.5 spaces per unit. TEC concurs that this bylaw requirement is met.

Site Plan Characteristics

Note that aspects of the site plans that enter State Highway Layout (SHLO) are under the purview of MassDOT. Although many of the following comments relate to the overall site and driveway locations, TEC has provided specific recommendations and comments for areas within SHLO that MassDOT are anticipated to ask as part of their Permit to Access State Highway review.

1. The Applicant should provide turning templates showing the ability of refuse vehicles to access, circulate, and egress the site through the circulation pattern without leaving the paved surface. The refuse vehicle shall be able to access the site without encroachment over the double yellow line on Essex Road (Route 133).
2. The Applicant shall provide a dedicated plan for all traffic signage and pavement markings to be installed as part of the project. A sign summary shall also be included which depicts the sign legend, sign size, and sign lettering dimensions in compliance with the Manual on Uniform Traffic Control Devices (MUTCD).
3. The Applicant should coordinate with the Town of Ipswich Fire Department for preferred locations and sign requirements for fire lanes within the site (if needed) and confirmation of hydrant locations.
4. The Applicant should provide vehicle turning templates to verify that a Town of Ipswich fire apparatus can circulate freely throughout the site in the event of an emergency.
5. The Applicant should consider relocating the maintenance building on the southeast corner of the site to ensure access to all sides of the 24-unit building.
6. The Applicant should indicate the vertical datum that the existing conditions survey is based on.
7. The Applicant should provide a list of requested waivers on the site development plans.
8. The Applicant should provide dimensions to the proposed parking spaces and drive aisles on the Site Layout plan.
9. The Applicant should provide a parking summary table that displays the number of required/proposed parking spaces, and the number of required/proposed accessible spaces on the Site Layout plan.

10. The Applicant should provide the *proposed* Building Area and Open Space along with the already provided Required Max Building Area, and Min. Open Space.
11. The Applicant should correct total sheet number, on sheets numbered 2 through 4.
12. The Applicant should provide an Erosion Control Plan for proposed construction per Section X.C.7 of the Ipswich Protective Zoning Bylaws.
13. The Erosion Control Plan should show proposed locations of stockpiles; all stockpiles shall be outside the wetland buffers.
14. The Applicant should provide the following per Section X.E.2 of the Ipswich Protective Zoning Bylaws:
 - a: Owner's address and signature;
 - b: Addresses in addition to the names of all abutting property owners;
 - g: Existing building setbacks;
 - h: The location, size, and type of all signs and exterior lighting;
 - i: The lot area of the parcel;
 - k: The approximate location of all buildings within 200 feet of the parcel;
15. The Applicant should specify if the interior zoning district line is a property line, and provide the Bearing and Distances of it.
16. Further clarification on the proposed sewer system is needed; including detailed sewer inverts, and a detail for the force main tie-in. The Applicant should provide a sewer design (pump station) stamped by a professional engineer.
17. The project is proposing 194 units of new housing, it is unclear if the existing utility infrastructure is capable of handling the new use. The Applicant should coordinate with the Ipswich Utilities department to determine if adequate capacity exists for all town-owned utilities.
18. The Applicant should provide an estimate for water usage and sewer flows so the Town can determine if there will be any implications to downstream infrastructure.
19. The Town may benefit from a third party review by a Registered Landscape Architect to determine if the proposed plantings are adequate for screening and meet the intent of the Ipswich Zoning ByLaw.

20. The Applicant should indicate if an irrigation system will be installed for the extensive landscaping. An irrigation system could add to the demand on the Town's water system.
21. The proposed subdivision line will result in several decks/stairs within the setback of the new property line. The Town Building Inspector should review and determine if the proposed property line is allowed by right.
22. It is unclear if the new buildings will be serviced by underground or overhead electrical wiring. The proposed electrical connections and equipment should be shown on the site plans.
23. The project is proposing two new buildings totaling 64 units that will directly abut a single family home in the Rural Residential zoning district. These two buildings are located within the Rural Residential district.
24. The Town may benefit from a third party review by a Registered Architect to determine if the scale and massing of the proposed buildings is appropriate in comparison to the current neighborhood.
25. The vegetated buffer between the new development and existing single family home should be revised to a minimum of 20-feet in width, exclusive of the proposed retaining wall.
26. The site plans should be revised to call out snow storage areas.
27. Further detail is required to properly review the proposed retaining walls. TEC suggests that a "top-of-wall" and "bottom-of-wall" elevation is provided every 50-feet along the proposed walls.
28. The site plans should be revised to display the existing and proposed tree line (limit of clearing).
29. The Applicant should submit a subdivision plan that shows that all of the zoning requirements are being met for the newly created lots.
30. Several zoning setbacks are not being met by the proposed plan. The front-yard setback to the townhouses and maintenance building should be 50-feet minimum, and the rear-yard setback at the townhouse should be 30-feet minimum.
31. Several townhouses are proposed within the 65-foot no-build buffer zone to wetlands. The site plans should be revised to shift these buildings outside of the buffer zone.
32. The Site Plans should be revised to provide loading zones as required for each new building. It is unclear if each new building will receive deliveries directly to the building or if a centralized delivery location is proposed.

33. The site plans do not address trash removal or dumpster locations. It is unclear if a centralized dumpster location will be utilized or if each building will have its own dumpster.
34. The proposed lighting plan does not meet the requirements of the International Building Code. Section 1008.2 indicates that a minimum illumination of 1 foot-candle must be provided along all egress paths from the building to a public way.

Stormwater Management Plan

1. The Stormwater Report should include a section to address the 10 standards identified in the Massachusetts Stormwater Handbook. This section should include calculations to show that the required recharge volume and water quality volumes are being provided.
2. The Site Plans should be revised to properly label (numbering) the proposed subsurface infiltration basins.
3. A detail should be provided for the proposed vegetative filter strips that meets the requirements of Volume 2 Chapter 2 of the Massachusetts Stormwater Handbook.
4. The project is considered a Land Use with Higher Potential Pollutant Load based on the trip generation summary in the submitted traffic report (>1,000 trips per day). All proposed Best Management Practices (BMPs) must be designed to meet the standards for LUHPPLs.
5. A detail should be provided for the proposed stone for pipe ends, and calculations should be submitted to show that the stone is adequately sized to dissipate the stormwater flows from the site.
6. The bio-retention details should be revised to accurately show the bottom of stone elevation associated with the proposed underdrain. There are currently several elevations shown (37.23, 37.5, 38.5).
7. Although it is not required, TEC recommends that an emergency overflow pipe be provided for the subsurface infiltration basins.
8. For LUHPPLs, the bioretention systems should be lined until a minimum of 44% TSS removal is achieved. For the current layout, the entire bioretention system should be lined with an impermeable fabric.
9. The pre-development watershed map should be revised to clearly define the proposed watersheds. The Time of Concentration path for each watershed should be labeled on the maps.
10. It appears that the area northeast of the site may flow towards the site. If this is the case, this area should be accounted for in the design of the proposed stormwater BMPs.

11. The Site Plans do not currently show any upgrades to the existing stormwater system within the subdivision Lot H, however it appears that the entire parking area is drained through a 6" pipe.
12. The existing outlet from the stormwater system on Lot H is located right at the edge of the wetland system. If upgrades to the existing stormwater system are required, the stormwater outfall should be pulled back as far away from the edge of wetlands as possible.
13. The HydroCAD analysis of bioretention system #2 currently shows two primary outlet devices which may be causing incorrect calculations. The rectangular weir should be modeled as a Device 2 to the 18-inch culvert (same routing as pond BIO-1).
14. Based on the provided detail for the subsurface infiltration basin #1, the minimum cover requirement is not being met. It appears that a minimum grade of 46.33-feet is required to meet minimum cover.
15. The groundwater elevation at pond BIO-2 is incorrectly labeled as elevation 36.9-feet. Based on the test pit information, the groundwater should be at 38.9-feet. The Stormwater Report and BMP should be revised based on this information.
16. The deep observation hole #13 indicates that a layer of silt loam is located within the proposed subsurface infiltration basin. The HydroCAD modeling indicates an infiltration rate of 2.41 inches per hour, which is associated with a loamy sand soil type. The engineer should submit documentation or references that show that using a higher infiltration rate is acceptable although there is a more restrictive layer present below it.

If you have any questions regarding the peer review, please do not hesitate to contact us at (978) 794-1792. Thank you for your consideration.

Sincerely,
TEC, Inc.
"The **Engineering Corporation**"



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