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MEMORANDUM

TO: Honorable Peter Dolan, Supervisor

FROM: Jeffrey Marsden, P.E., P.P., CME

RE: **TUXEDO RESERVE – REVIEW OF DRAFT SEIS**

DATE: August 24, 2009

CC: Elaine Laurent, Town Clerk
Bonnie Franson, AICP
Thomas Egan, Esq., Planning Board Attorney
Larry Wolinsky, Esq., Town Attorney
Andrew Dance, Related Companies (applicant)

H2M's current review of the Draft Supplemental Environmental Impact Statement (SEIS) only addresses the items in Chapter Six (Hydrology and Stormwater Management) and Chapter Seven (Construction Impacts). This review is based on the Draft SEIS Prepared by Tuxedo Reserve with a date of July, 2009.

The Draft SEIS should address the following;

CHAPERT 6

- Paragraph "B", discusses the Little Wee-Wah Lake, the Wee-Wah Lake, and the Wanaque River drainage basin. These lakes and drainage areas should be shown on the graphic displays in the chapter. What area drains into the Wanaque River Basin?
- The graphic in Figure 1 shows a dark red line adjacent to the Ramapo River. This line should be described in the legend.
- The drainage areas should be displayed for all the watersheds on one graphic.
- Paragraph "C" discusses the results of the Town Board denying the Special Permit modification. The report indicates that the applicant proceed with the 2004 plan which would have significant impacts to the high value environmental areas such as vernal pools and subsequent habitat for species of special concern. This would not be allowed by NYDEC or the Army Corps and as such, they could not proceed with the 2004 plan without a significant re-design of the development.
- Paragraph "D" discusses the stormwater impacts on the Tuxedo Lake and Mountain Lake areas. However one significant difference between the 2004 plans and the 2008 plans is the elimination of on-site detention basins. It is our understanding that the applicant proposes to provide a regional detention basin in Sloatsburg. The applicant should provide some written verification that both Rockland County and Sloatsburg agree to this concept or agree to allowing the direct discharge of all the un-detained stormwater form the Tuxedo Reserve development into their jurisdiction.
- Paragraph "D" also discusses the impacts on Mountain Lakes and Tuxedo Lakes as a result of the proposed changes in the development. The applicant should indicate that all efforts will be made during the final design and construction to minimize direct runoff from the roadway to the lakes.

- **General Hydrology Comments on DSEIS for Tuxedo Reserve**

  The report provides contradictory and misleading statements on the issue of surface water/groundwater interactions. On one hand, the report states that each of the two lakes is a spring-fed water body (p. 6-2) but on the other hand it suggests that "ground water is situated well below the ground surface and is

actually below the elevation of Mountain Lake" (Page 6-3). If this was true, this lake would be a water-loosing body rather than a spring-fed body (which it actually is).

The low reported position of groundwater is based on the depth to water of approximately 50 and 150 feet reportedly measured in test wells previously drilled around Mountain Lake and the NYSDEC wetlands (p. 6-3). However, the measured depth to water was not a true depth to the water table, but an apparent depth representing a composite of water levels in all water-bearing fractures penetrated by the long open holes of the drilled test wells. If a TV camera was lowered into the test well, wet walls and films or drips of water would be seen well above the (composite) water level, attesting to a draining impact of the test holes on groundwater. This draining impact results from a strong downward gradient created by large differences in topographic elevation between the true water table and the low hydraulic heads of transmissive fractures intersecting the lower portion of the test holes.

A true groundwater table likely resides within overburden/till deposits or shallow bedrock, which also provide the bulk of aquifer storage, being capable of storing more water than fractures in the underlying crystalline bedrock. It is groundwater in the overburden and the shallow bedrock that feeds the lakes. The report provides no site-specific data on the thickness and distribution of overburden/till deposits within the project area or –what would be of particular interest – adjacent to the lakes and wetlands. Some drilling data are apparently available and may have been included in an earlier report, but not in this report.

Across the state line, in northern NJ, the following pattern of till distribution (resulting from the southerly direction of glacier advance) is observed: the (lodgment) till is generally thicker and more continuous on the NW facing slopes, while SE facing slopes have more plucked bedrock outcrops. A perusal of Google aerials for the project site suggests that this asymmetric pattern of till distribution may also apply to this site. In such a case, the NW facing slopes are expected to contribute more groundwater flow to the lakes or wetlands than the steeper SE facing slopes. Simple mapping of overburden thickness and distribution, augmented by the existing drilling data, would be helpful for elucidation of groundwater-surface water interactions and project impacts.

The second full paragraph on page 6-7 reflects more confusion in the report on the meaning of the depth to groundwater measurements and the groundwater-wetland-lake interactions. The report claims that the presence of the wetlands and the lake are not evidence of a groundwater-surface water connection, as the "depth-to-ground water" in this area (as presumably measured in test wells) is 50 to 75 feet below grade, which would be below the elevation of water in the wetland. The report does not recognize a composite character of the water level measured in long bedrock test holes, or the occurrence of groundwater in the overburden/shallow bedrock units which actually feed the wetlands and the lake at dry periods. The report's conclusion that the wetlands and the lake have no connection with groundwater "but are coincidental only due to topography" does not address this basic question: How are the wetlands and the lake sustained during periods of drought? They would not likely survive droughts if they were simply functioning as natural detention ponds implied by the conclusion.

The report discusses the proposed on-site water supply well system (middle of page 6-7). I presume that the low water levels in bedrock wells were measured in the wells drilled for the system, and that some of these wells were drilled near the wetlands and the lake. These open-hole well borings provide vertical conduits for downward groundwater flow from the shallow bedrock and the overlying overburden with wetlands and the lake <u>even if they are not pumped/used for water supply.</u> Draining effects from these wells on the wetland/lake system can be significant, particularly during dry periods, as each well bore is likely to divert, on a continuous basis, a flow ranging from a fraction of a gallon per minute (gpm) to several gpm from the lake and wetland. This unsuspected water diversion from the

wetland/lake area can be ascertained by measurements using a heat-pulse flowmeter or salt tracing. The amount of the diversion depends on the number of supply wells, their locations/layout and the length of surface casing.

The Applicant should consider cumulative negative impacts on the wetlands/lake system due combined draining effects of the water supply well system, an increase in impermeable area coverage (decreased groundwater recharge) and drainage/diversion resulting from proposed bedrock blasting operations. Downcutting of bedrock slopes by the proposed blasting to a depth of 30 to 50 feet will create a kind of de-watering with cuts/trenches diverting groundwater flow from the slope to surface runoff, instead of slowly feeding the wetland/lake system as groundwater flow. Blasting-induced fracturing would result in faster slope drainage. Contrary to statements in the report, the proposed blasting depth is well within the true water table.

The nature of the two lineaments identified on Figure 6-3 as bedrock faults and in the text as bedrock fractures (p.6.3) is not clear. The nature should be determined based on the most detailed geologic map available for this area and also verified by a field inspection. Then the hydraulic significance of this feature, if any, can be properly evaluated.

The report states that the sediment samples from Mountain Lake "identified exceedances of New York State Sediment Criteria, but fails to specify which criteria were exceeded.

CHAPTER 7

- **Construction Activities**
  The construction phasing indicates that construction of the roadways and infrastructure would be the first operation after the clearing is done and the staging areas have been established. Will the blasting for the roadways and the building pads be done at the same time or will the individual builders be doing their own blasting. The blasting protocol should be discussed in this document.

- **Limits of Disturbance**
  The Limit of Disturbance (fig-3) has been modified to show the location of proposed walls and rock cuts, as requested; however the heights of the walls and cuts should be discussed.

- **Earthwork Calculations**
  The developer needs to indicate how they will allow for stripping volumes. There will be a large amount of tree and stump removal required. Although the volume will be part of the overall cut volume, this portion of the the cut can not be considered as reusable. An adjustment needs to be made to the cut volume to allow for this.

  The initial earthwork calculations and backup submitted for review proved to be riddled with math, typographical, and transposition errors. There were a number of re-submissions required during the review process prior to the issuance of the final document. The initial earthwork table indicated that there was an excess cut of 145,000 cubic yards for the entire site. The developer testified that this would be an acceptable amount of excess material due to the fact that this material would be needed for roadway base and building foundation base. However, the final earthwork calculation, after corrections, indicates that there is only 1,000 cubic yards of excess cut for the entire project. This would require the developer to either import fill or to redesign the vertical profile during the final design.

The final Earthwork Table in the report still has an error. The top line of Phase 1C should indicate an unadjusted cut of 48,908 CY and adjusted cut of 62,846 CY for an overall cut of 56,000 CY. This will result in a total excess cut of 1,000 CY for the entire project.

- **Impervious Coverage**
  There were no calculations submitted with the report to support the proposed impervious coverage; however, a review of the plans indicated that the amount of impervious coverage is reasonable for a project of this magnitude.