AMG

11-16-83

Memo re: drainage report

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Elson T. Killam Associates, Inc.

MEMORANDUM

TO: JOHN E. COLEY, JR., ESQ.

FROM: JAMES J. COE

SUBJECT: AMG REALTY COMPANY AND SKYTOP LAND CORP. PROPOSAL, WARREN TOWNSHIP

DATE: NOVEMBER 16, 1983

As requested, I have again reviewed the drainage considerations affecting Warren Township in general and the subject properties. I have given particular attention to the proposal to develop these properties more densely than allowed by current zoning and have also reviewed the three portions of the Township which are proposed to be zoned for 6-7 units/acre development.

I participated in the preparation, during 1975 and 1976, of a two volume "Report Upon Drainage and Storm Water Runoff within Warren Township." During the preparation of this report I investigated the various streams within the Township and reported upon the then existing drainage conditions, the conditions which might be expected with full development, and the conditions that could be expected if alternate development schemes were implemented. The purpose of the report was to provide recommendations, guidelines, and suggestions that might allow the Township to remedy existing problems and avoid future problems with runoff and erosion.

I believe it is recognized that Warren Township, for the most part, encompasses a portion of the Second Watchung Mountain. The ridge line of this mountain generally bisects the town in an east to west direction. Runoff north of this ridge line flows in a northerly direction by overland flow and in relatively small streams to the Dead River or Passaic River, which form the northern boundary of the Township. In nearly all cases these streams can be characterized by steeply sloped, unlined, natural channels. The channel slopes generally flatten abruptly as they approach the flood plain of the Dead or Passaic Rivers. These streams typically cross anywhere from two or three to several roadways, where culverts have been constructed to pass the flow. In many cases the culverts were constructed many years ago, at a time when the extent of development which the Township has since experienced was not envisioned. The additional runoff generated by this development was also not anticipated in the design of these culverts, and in many cases they are severely inadequate to handle storms of even nominal intensity. Other culverts have been constructed over the years in conjunction with development, and in many cases these too are inadequate for major storms.

The portion of Warren Township south of the ridge line of the Second Watchung Mountain has characteristics almost identical to that of the northern portion of the Township. Again, steeply sloped, unlined, natural channels drain the mountain, conveying the flow to the East Branch of Middle Brook. The East Branch of

Middle Brook is a more gently sloped water course having, in areas, a wide flood plain.

Because of the general topography and drainage characteristics which prevail, a large proportion of the Township has severe development restraints--that is, it is either steeply sloped or flood plain/wetland areas--which are not conducive to most forms of development.

The reports prepared by this office in 1975/1976 evaluated whether zoning modifications might minimize the runoff and erosion problems which prevailed within the Township. Consideration was given to either reducing the zoning density from 1-1/2 acres to 2 acres or perhaps requiring the clustering of development in portions of a particular parcel of land in order to avoid development of the more sensitive areas, and also reducing the total area of impermeable surfaces. As evaluated, clustering would not increase or decrease the number of units which could be developed on a parcel. It was found that each of the alternatives would result in some improvement of runoff and erosion conditions. The degree of improvement was found to depend upon conditions peculiar to the particular watershed (degree and location of existing development, existing culvert capacity, etc.).

The streams which drain the AMG Realty and Skytop Corp. properties are consistent with the general characterization of streams in the Township, and if anything, conditions may be more severe than the average. In the case of Dock Watch Hollow Brook, to which the AMG Realty property and a portion of the Skytop property drain, there are serious deficiencies in existing culvert capacities. Severe erosion problems also exist in this drainage basin.

It was reported in 1975 that because the Dock Watch Hollow Brook watershed had neared complete development, in accordance with the then existing zoning, little could be accomplished by modifying zoning regulations to minimize runoff and erosion. It was indicated that only a ban on further development in this drainage basin, which was felt to be impractical, would have a significant effect.

At the time, it was not envisioned that development even more dense than that of the existing zoning would ever be proposed on the small amount of undeveloped land which remained in this drainage basin.

The development which is proposed is located in the most upstream portion of the Dock Watch Hollow Brook watershed and could severely affect all of the downstream culverts, most of which are deficient to carry the flow generated by the existing level of development.

A portion of the Skytop property is drained by an unnamed tributary to the Dead River. At the time of our study it was noted that this watershed was lightly developed. Since that time little additional development has occurred with the exception of the Chubb Insurance Co., which has been constructed on one of the more mildly sloped and less sensitive portions of the watershed between Route I-78 and Mountainview Road.

Much of the remaining acreage in this watershed has severe development restraints imposed by the steep slopes which exist. Although the proposed Skytop site includes some mildly sloped land at the top of the Second Watchung Mountain, the drainage from this area would flow down the steep north slope of the Second Watchung Mountain. Severe erosion conditions have been observed along this slope.

It was also reported that if the zoned level of development were to occur in the upstream portions of this watershed, a major detention basin should be constructed just upstream of the Mountainview Road culvert. The previous studies did not anticipate high density development in this portion of the Township. Therefore, evaluations were not made of the effect that this type of development would have on the existing culverts and stream beds. Without question, however, increased runoff would be created by development, and it is generally understood that the higher the density of development, the greater the amount of runoff generated.

The peak rate of runoff can be controlled to a great extent by detention basins. However, it should be noted that although detention basins can be extremely valuable with respect to minimizing the effect of development upon the capacity of existing culverts and streams, they do extend the time that a stream bed is subjected to runoff. They, therefore, do very little to control erosion, and in some cases could aggravate this problem.

It is anticipated that the construction of the detention basin at Mountainview Road may be absolutely necessary if high density development were to occur in the upper portion of this watershed. The location of this detention basin avoids some of the problems previously referred to since the slope of this tributary flattens between Mountainview Road and the Dead River. Unfortunately, this detention basin would have no effect upon erosion upstream and would probably be the receptacle where great amounts of eroded material would come to rest. It would therefore require frequent maintenance. Lining the channels with concrete or constructing check dams to artificially flatten their slopes would be remedial measures which could be utilized to minimize erosion in this drainage basin. However, the overall environmental health of the watershed might not be enhanced by such construction.

In summary, it is felt that the overall topographic and drainage conditions in Warren Township are not conducive to high density development. The location of the particular developments which have been proposed--that is, in the headwaters of small water courses--would tend to maximize their adverse effect upon drainage and erosion, and for this reason this proposal appears inappropriate.

We have completed a review of the three sites on which the 6 to 7 units per acre development is proposed. In each case, it appeared that consideration was given to the drainage characteristics of the site during the process through which these zones were selected.

The first of the sites is located generally between Stirling Road and Stiles Road. A branch of Stony Brook runs through this site, and it is presumed that the improvements necessary along the stream would be part of the development plan

for this property. It was reported in 1975 that "Downstream of the Stiles Road culverts, the channel has steeply sloped banks which contain storm waters very effectively. As previously mentioned, the Stirling Road Bridge has adequate capacity to pass major storms." Accordingly, it appears that development of this site would require improvement of the West Branch of Stony Brook through the site and possibly replacement of the Stiles Road culvert, but no long-term flooding or erosion problems would appear evident as a result of development of this site.

The second site proposed for higher density zoning is located north of Mountain Boulevard and east of Mount Bethel Road. This land comprises a portion of the south slope of the Second Watchung Mountain and lies in an upstream portion of the East Branch of Middle Brook. The northern limit of the property lies at the base of extremely steep portion of the mountain (approximately 25 percent slope), and the slope across this property, generally running from north to south, varies from about 10 to approximately 5 percent at the southern perimeter. Drainage on the site is presently carried in a number of small streams running from north to south, crossing Mountain Boulevard at culverts, and thereafter entering the East Branch of Middle Brook, within a short distance after crossing Mountain Boulevard. As indicated, the slope of this parcel is generally between 5 and 10 percent -- less than the 15 percent which was recommended in our 1975 report for development restriction. The steeply sloped land north of the development should remain undeveloped. The topography of the site appears conducive to the construction of retention basins to mitigate the increased runoff that will occur. Stream slopes downstream from the development are not particularly severe, and accordingly severe long-term erosion as a result of development is not anticipated. Of course, erosion control measures during construction would be necessary, as are required for all development projects.

The third site proposed for development at 6 to 7 units per acre abuts Liberty Corner Road and Mountain View Road. This site is located along a small tributary identified as Branch D-2A in our 1976 report. Development on this tract would necessitate the replacement of an existing severely inadequate culvert crossing Mountain View Road. Downstream of Mountain View Road drainage and erosion conditions are not severe and are mainly controlled by the Dead River, which is the large tributary of the Passaic River, forming the northern boundary of the Township. Upstream of Mountain View Road Branch D-2A lies within the development tract which facilitates the control of runoff and erosion. The stream within the development tract would have to be improved and stabilized as part of the on-site development plan.

Each of the sites proposed by the Township for higher density development appear to minimize the downstream and off-site impacts as a result of the anticipated higher volume of runoff to be created. Their proximity to large downstream drainage corridors makes them superior to the sites proposed by the developers from the standpoint of runoff and erosion control.

JGC:kap