C. TOPOGRAPHY/GEOLOGY/SOILS

Terrain in the Boght Road - Columbia Street area is generally flat to rolling ranging in elevation from one hundred eighty (180) feet to four hundred forty (440) feet above sea level. The lowest elevations and steepest slopes are generally associated with the Dry River area. These elevations range from one hundred eighty (180) feet to two hundred thirty (230) feet above sea level and slopes are all less than fifteen (15) percent (Exhibit II-C-1).

South of Boght Corners, between Dunsbach Ferry Road and Route 9, is the study area high point of approximately four hundred forty (440) feet above sea level. The central and developed portions of the site are the most level with elevations ranging from three hundred (300) to the hundred ninety (390) feet above sea level. Slopes are generally less than three (3) percent.

The southeast portion of the project study area between Boght Road, Miller Road, Swatling Road and Troy-Schenectady Road is also fairly level but at lower elevations. These elevations generally range from two hundred (200) to two hundred sixty (260) feet above sea level. Slopes again are gradual ranging from zero (0) to eight (8) percent with some areas of up to fifteen (15) percent slope.

Five (5) geologic units are located within the project study area and include bedrock, lake clay and silt, wind blown sand and lake sand, stratified drift and glacial till. A general description of these units is outlined below.

According to the Town of Colonie Environmental Inventory Technical Report, two (2) types of bedrock are found within the project study area, shale and sandstone layers. Bedrock generally forms stable slopes and is relatively impermeable. Bedrock ranges to depths greater than twenty (20) feet.

N

800 0 800 2400 4800

SCALE: 1" = 2000'

SARATOGA COUNTY

ALBANY COUNTY

MOHAWK RIVER

PROJECT STUDY AREA

CITY OF COHOES

TOWN OF COLONIE

CITY OF WATERVLIET

0-3% SLOPE

3-8% SLOPE

8-15% SLOPE

15% OR GREATER SLOPE

SOURCE:
TOWN OF COLONIE CONSERVATION ADVISORY CONCIL MAP

CLOUGH, HARBOUR & ASSOCIATES
ENGINEERS & PLANNERS

SLOPES

EXHIBIT II-C-1

BOGHT ROAD – COLUMBIA STREET AREA, DRAFT GEIS, TOWN OF COLONIE

Large areas of lake clay and silt, a thinly bedded clay with interbedded sand, are located within the Boght Road - Columbia Street area. Lake clay and silt are generally impermeable and usually unstable on steep slopes.

Stratified drift, a layered sand and gravel, can vary from very clean to very dirty silty stratified drift. This geologic unit is normally well drained and permeable, good for medium rise construction. Glacial till is a heterogeneous mixture of clay, silt, sand and gravel which is a dense, impermeable layer which contributes to poor drainage. Till provides good foundation support but can be slippage-prone in areas with steep slopes.

Soil conditions vary within the project study area. Exhibit II-C-2 delineates soil types and Appendix 2 includes descriptions of the soils found within the project limits. These soils are the result of Glacial Lake Albany, along with reworking by wind and water as well as deposition of glacial till.

The diversity of soil types results in a variety of conditions. Thickness of soils range from zero (0) to greater than twenty (20) feet. Exhibit II-C-3 indicates depth to bedrock within the study area. In addition certain soil types are well drained while others are poorly drained and permeability ranges from rapidly permeable to slowly permeable. As indicated in Section II, E, Groundwater, portions of the project study area exhibit seasonal high groundwater. This may be a result of perched water tables due to impermeable soils.

In order to assess slope stability in the study area, bedrock elevation, soil type, and topography, maps were reviewed. These maps were used as a guide for the field reconnaissance conducted as part of this review and also aided in the development of a land slippage ranking system. For the purpose of this study the ranking system was used to categorize the potential for existing slope instability based upon a number of factors. The review of subsurface or topographic conditions

N

800 0 800 2400 4800

SCALE: 1" = 2000'

MOHAWK RIVER

SARATOGA COUNTY

ALBANY COUNTY

PROJECT STUDY AREA

CITY OF COHOES

TOWN OF COLONIE

CITY OF WATERVLIET

LEGEND

1	HUDSON	13	UNADILLA	51	BURDETT
2	RHINEBECK	14	SCIO	80	VALOIS
3	MADALIN	15	RAYNHAM	113	MANLIUS
7	UDORTHENTS	16	BIRDSALL	122	NASSAU
8	UDORTHENTS – URBAN LAND	21	RIVERHEAD	250	HUDSON
9	URBAN LAND COMPLEX	30	COLONIE	265	NASSAU
		50	NUNDA	311	URBAN LAND
				305	FLUVAQUENTS

SLOPES: A 0 – 3% D 15 – 25% H HILLY
B 3 – 8% E 25 – 35% R ROLLING
C 8 – 15% AB 0 – 8% U UNDULATING

SOURCE:
TOWN OF COLONIE CONSERVATION ADVISORY COUNCIL MAP

CLOUGH, HARBOUR & ASSOCIATES
ENGINEERS & PLANNERS

SOILS

EXHIBIT II-C-2

BOGHT ROAD – COLUMBIA STREET AREA, DRAFT GEIS, TOWN OF COLONIE

N

800 0 800 2400 4800

SCALE: 1" = 2000'

SARATOGA COUNTY

ALBANY COUNTY

MOHAWK RIVER

PROJECT STUDY AREA

CITY OF COHOES

TOWN OF COLONIE

CITY OF WATERVLIET

LEGEND

DEPTH TO BEDROCK: 0–60"

DEPTH TO BEDROCK: 60"+

SOURCE:
TOWN OF COLONIE CONSERVATION ADVISORY COUNCIL MAP

CLOUGH, HARBOUR & ASSOCIATES
ENGINEERS & PLANNERS

DEPTH TO BEDROCK

EXHIBIT II-C-3

BOGHT ROAD – COLUMBIA STREET AREA, DRAFT GEIS, TOWN OF COLONIE

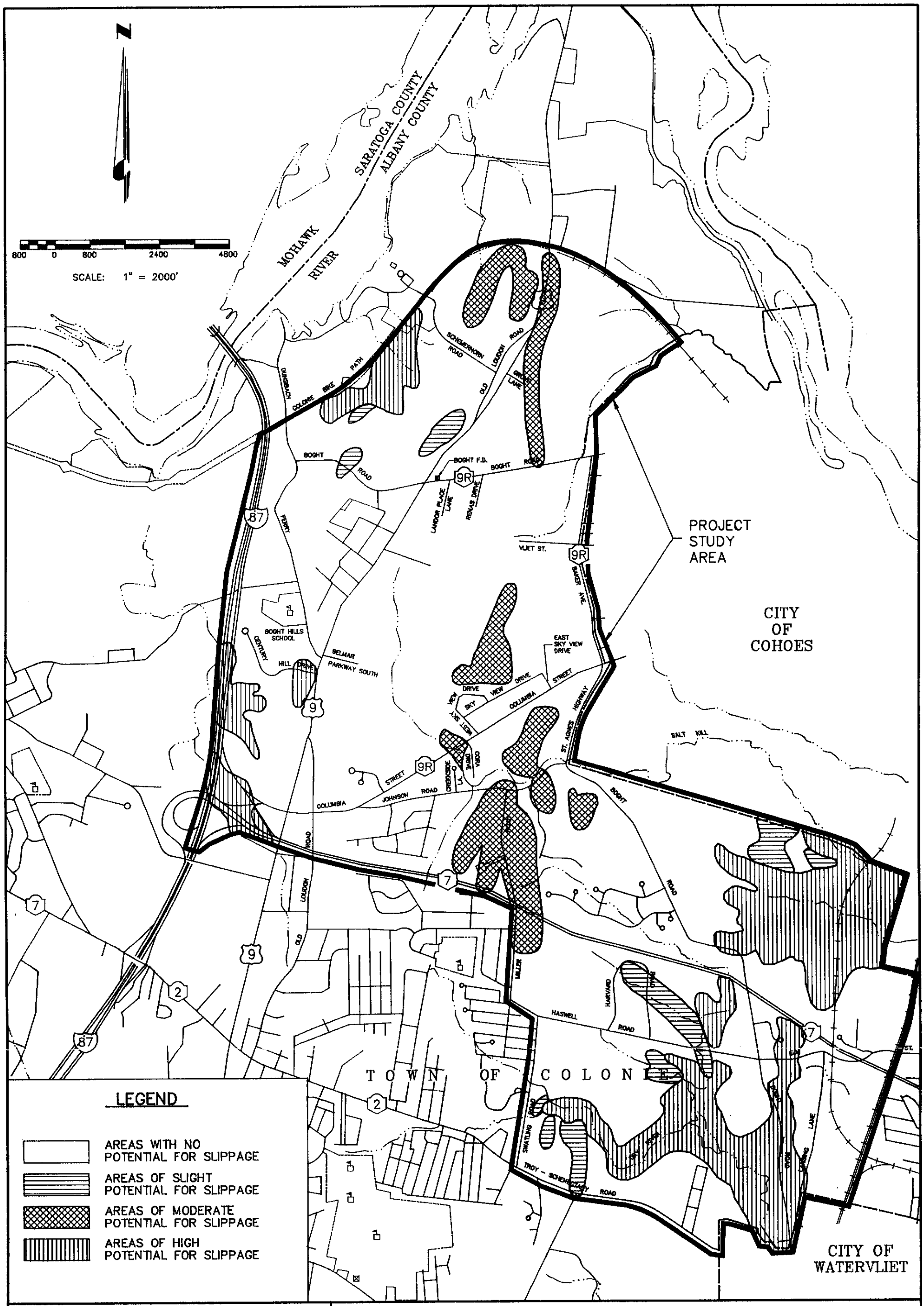
as summarized in the following paragraphs was used to assess the potential for slope failure and categorize the risk of instability problems within the study area as slight, moderate or high.

1) Locate areas where bedrock is at a relatively shallow depth. Bedrock acts to intersect natural failure planes in a soil mass and generally limits the severity of land movements. In cases where bedrock is at depths greater than twenty (20) to thirty (30) feet, slope failure is more apt to be of a significant concern than in areas where bedrock is closer to the surface.

2) Locate areas that have a relatively deep depth to bedrock as described above and also correspond to areas where existing slopes are considered great enough to warrant concern. In general slopes in excess of two (2) horizontal to one (1) vertical will warrant the greatest concern. In cases where there is little or no surface relief the mass of soil and driving force necessary to create a land slippage does not exist. The greater the slope, the greater the driving force of the soil; therefore areas where slopes are greater are considered to be more critical with respect to slope failure.

3) Locate areas that conform to the conditions stated in two (2) above and also correspond to soil types more prone to slippage. In general, granular soils with small amounts of silts are more stable than silts or clays.

Areas within the proposed region of development that possess the characteristics described in item 1 above, have been denoted on Exhibit II-C-4 as areas with slight potential for slippage. Other areas that correspond to conditions stated in item 2 above are denoted on the same Exhibit as areas with



CLOUGH, HARBOUR & ASSOCIATES
ENGINEERS & PLANNERS

SLOPE STABILITY STUDY AREAS

EXHIBIT II – C – 4

BOGHT ROAD – COLUMBIA STREET AREA, DRAFT GEIS, TOWN OF COLONIE

moderate potential for slippage. The remaining areas, corresponding to the requirements noted in item 3 are those areas with the highest potential for slippage. These areas have also been delineated on Exhibit II-C-4.

It should also be noted that the combinations of conditions outlined previously in steps one, two and three are historically those which combine to facilitate slippage of natural soil terrain. Basic engineering principles have also been considered in forming the method of analysis previously described.

A thorough field reconnaissance was conducted for all areas where future development is proposed and some potential of slope failure is thought to exist. Those areas are shown on Exhibit II-C-4.

In general, most of these areas consist of small rolling hills, with vegetation ranging from brush to dense wooded areas. These areas revealed no visual evidence of recent earth movement. Historical evidence has shown that slope failures very rarely occur in areas with the characteristics observed and previously described.

As a result, most locations observed were described as having a slight to moderate potential for slope movement. Seven (7) areas are denoted on Exhibit II-C-4 as having a high potential for slippage based upon the ranking criteria stated above. The field reconnaissance however, noted that the undeveloped section near the Dry River area posed the most significant risk of all areas shown on Exhibit II-C-4 as having a high potential for slippage. Slopes in this area were observed to be steeper than in any other portion of the study boundaries with some small localized slippage noted.

Impacts and Mitigation Measures

Changes in land use will have an impact on the topography, geology and soils of the study area. The flat to rolling topography will present few obstacles for construction as slopes are nearly all less than fifteen (15) percent. The removal of vegetation and the cut and fill operations associated with construction projects will however, alter the terrain of the area and could potentially lead to soil erosion problems discussed later in this section.

In order to maintain the natural topography to the maximum extent possible, site plans should be designed that will include existing vegetation and topography. This can include the use of cluster developments, recreation and open areas, and the maintenance of existing elevations whenever possible.

Areas where depth to bedrock is less than five (5) feet (Exhibit II-C-3), present a variety of development constraints. Although bedrock provides good support for foundations, the shallow soils may preclude the construction of homes with basements unless large quantities of fill are imported. In addition, the installation of septic systems would be difficult as well as costly.

Depth to bedrock combined with topographical conditions and the proposed construction may require the blasting of bedrock to reach the proper elevations. Primarily this will result in increased construction costs. These additional construction costs would be the economic responsibility of the specific developers or utilities with the exception of the Latham Water District and Town of Colonie Pure Waters Department. The costs associated with increasing the capacity of these services are discussed in detail in Section II, H, Utilities of this GDEIS.

Exhibit II-C-3 delineates areas where depth to bedrock is less than five (5) feet. As a supplement to this exhibit, the soils information collected by the Town of Colonie Conservation Advisory Council which provides more specific depths to bedrock for different soil types should be considered. This information indicates that most of these areas delineated on Exhibit II-C-3 as shallow soils are at depths of four (4) to five (5) feet reducing some of the problems that may be associated with construction. Depth to bedrock of Nassau soils is generally one (1) to one and one-half (1 1/2) feet and Manlius soils is two (2) to three (3) feet. Nassau and Manlius soils are outlined in Exhibit II-C-2.

Any areas where developers propose to blast in order to construct residential or non-residential facilities should be closely monitored by the Town. Removing bedrock by blasting results in the transmission of vibration through rock which can potentially damage nearby structures. It is recommended that the Town require developers to adhere to the United States Bureau of Mine blasting procedures in order to preclude vibration impacts to nearby structures and residents. These procedures include:

- Notification of residents prior to blasting
- Pre-blast crack survey of nearby structures
- Provision of public contact for information
- Test blasts to determine amount of explosives required
- Avoidance of surface (air) blasts
- Maintenance of a peak particle velocity of no more than two (2) inches per second at the structures of interest

The construction of residential and non-residential facilities normally requires the removal of certain amounts of vegetation as well as excavation and fill on the building site. Stripping sites of vegetation,

especially large, phased projects will often result in erosion problems. This creates a problem on-site and also to nearby streams which will receive the eroded soil materials. Several actions can be taken to mitigate these problems. To the extent practical, natural vegetation should be left on-site, augmented by promptly establishing grasses and other ground covers. Excavation for phased projects should occur immediately prior to work proceeding in that section, thereby reducing the potential for erosion. In addition, when work is proceeding adjacent to or in the vicinity of hillsides or streams, steps should be taken to protect them. These steps can include the use of silt fences, terracing, haybales or other appropriate measures.

Another condition which can create problems during construction are soils that contain high water tables or perched water tables. These high water conditions create problems during excavation, the placement of footings and foundations and the installation of individual septic systems. Soils with a perched or apparent high water table during various times of the year within the study area include the Nunda, Burdett, Scio, Hudson, Valois, Raynham, Birdsall and Madalin soil groups. These soil locations can be identified on Exhibit II-C-2.

To mitigate this type of problem, the Town could require that homes and businesses be constructed with proper foundation drainage in place to reduce the potential for wet or flooded basements. Some areas may not be conducive to basement construction which would facilitate the use of slab-on-grade construction. Wet soils create severe limitations for the installation of septic systems, in these areas connection to the Town of Colonie Pure Waters Department system or the Albany County Sewer System should be considered.

Another potential problem regarding the installation of individual septic systems, is soils with poor filtering capabilities. Soils such as these allow liquid to pass through so quickly that biological treatment cannot occur and

groundwater contamination may result. Two (2) actions can be taken to mitigate this problem. Suitable soils with good filtering capabilities can be imported or the size of the leach field can be increased to reduce the effluent application rate. Excessively drained soils in the project study area include the Nassau and Colonie soil groups.

In regards to slope stability, if future development should occur in areas that have been identified as having a high potential for failure (Exhibit II-C-4), it is recommended that a complete site-specific slope stability analysis be performed which considers proposed construction, grading plan and existing topography.

The slope stability analysis generally should include test borings and/or test pits as required to define site specific soil conditions, additional field inspection, laboratory testing as required to determine the necessary soil parameters, and a calculation of the factor of safety against slope failure. Upon completion of the typical slope stability analysis, a summary of recommendations should be prepared to outline limitations for site development on or near critical slopes.

Based on the results of similar studies in the Capital District area, it is probable that general recommendations similar to the following would be made in the event of the development in or adjacent to the high risk areas shown on Exhibit II-C-4. It should be noted that these are not necessarily all the restrictions that would be imposed, rather suggestions that serve as representation of what could be required.

1) No development of existing ground or removal of existing ground cover should be allowed below the top of any slope found to be potentially unstable.

2) Site grading should be accomplished in such a manner to prevent the possibility of concentration of site drainage at the top of any potentially unstable slope. Underbrush should be cut to within ten (10) feet of the top of such a slope. Care must be taken in the development of lawn areas to prevent conditions at the top of a slope which might lead to concentration of drainage and development of erosion rills.

3) All collected storm or foundation drainage should be directed to the bottom of all slopes in adequately designed and sized structures. In most cases, ditches or swales should be lined with crushed stone and/or rip rap.

4) Site grading should prevent the impoundment or puddling of storm run-off, to inhibit the infiltration of water into site soils. If recharge basins are found to be required for a specific site, a detailed analysis of groundwater seepage from such structures as well as any impacts on adjacent slopes should be required.

5) Earth fills should generally be limited to those for landscaping purposes only. Typically, earth fill should be allowed to within ten (10) feet of the top of a slope. Fill grading beyond this point should usually be limited to gently sloping grades away from the top of a slope. Maximum fill heights should be determined based upon additional analysis as previously described.

6) Typically, no structures or earth embankments should be constructed closer than twenty-five (25) feet to the top of a potentially

unstable slope. This restriction should be verified by additional slope stability analysis including soil testing, based upon in-situ soil strengths.

Utilizing the steps described above and requiring site specific slope stability analyses for areas with a high potential for slope failure, will result in site plans that mitigate or avoid areas which have unstable slopes. As a result structures as well as soils and streams will be protected.