ARTICLE XV
Natural Resource Protection Standards

SECTION 162-1501. PURPOSE.

The purpose of this Article is to promote the public health, safety, and general welfare by minimizing adverse environmental impacts. This Article is intended to meet the following objectives:

A. Evaluate the potential environmental impacts on valuable natural resources and protect these resources through the implementation and enforcement of natural resource protection standards.

B. Identify and conserve environmentally sensitive lands including floodplains, steep slopes, woodlands, hedgerows, lakes, ponds, watercourses, riparian buffer areas, wetlands, and wetland margins.

C. Minimize disturbance of steep slope areas to limit soil erosion, protect natural vegetative cover, prevent siltation of streams and the degradation of water quality, and to prevent damage to property.

D. Protect water resources associated with carbonate geologic formations from land use and development patterns which would threaten their quality and quantity as a result of pollution and the alteration of natural drainage patterns.

E. Implement the recommendations for natural resource protection as described in the *Pennsbury Township Comprehensive Plan of 2006, as amended.*

SECTION 162-1502. GENERAL PROVISIONS.

A. It shall be a violation of this Chapter to regrade, fill, pipe, divert, channel, build upon, or otherwise alter or disturb a natural resource protected by this Article prior to the submission, review, and approval of:

1. Applications for zoning or building permits;
2. Subdivision or land development plans;
3. Conditional use or special exception approvals;
4. Zoning variances;
5. Timber harvesting plans; or
6. Any other applicable permit or approval required by the Township that would involve disturbance of natural resources protected in this Article.

B. In the event that two or more resources overlap, the resource with the greatest protection standard (the least amount of alteration, regrading, clearing, or building) shall apply to the area of overlap.

C. Where disturbance of a natural resource is permitted, it shall not take place until it has been determined by the Township Engineer, or other professional as designated by the Township, that such disturbance is consistent with the provisions of this Article and other applicable ordinance provisions.

D. Restrictions to the disturbance of resources shall apply before, during, and after construction on a site.

E. Plan information required by this Article shall be verified as correct by the Township Engineer or other qualified professional as determined by the Township Engineer.

SECTION 162-1503. NATURAL RESOURCE PROTECTION STANDARDS.

A. Floodplain protection standards.

Floodplain. Areas identified as within the Flood Hazard District of the one-hundred (100) year recurrence interval flood shall not be altered, regraded, filled, or built upon except in conformance with Article XVI and in accordance with Section 162-1504.

B. Steep slope protection standards.

1. Steep slope areas, whether natural or man-made, shall be preserved in their original state whenever possible. Where construction of roads, buildings, driveways, or infrastructure cannot be avoided, disturbance shall be kept to the minimum necessary and, in no case, shall it exceed the following permitted disturbance limits for any lot, or tract:

   a. Moderately Steep Slopes (15% to 25% slope) - No more than thirty (30) percent of moderately steep slopes shall be regraded, removed, built upon, or otherwise altered or disturbed.

   b. Prohibitively Steep Slopes (Greater than 25% slope) - No more than fifteen (15) percent of prohibitively steep slopes shall be regraded, removed, built upon, or otherwise altered or disturbed. In addition, the disturbance permitted on prohibitively steep slopes shall be limited to the following activities:

      1) Grading for the minimum portion of a road or driveway necessary for access to the principal use and sewer, water, and other utility lines when it can be demonstrated that no other routing is feasible.

      2) Timber harvesting, when conducted in compliance with the required timber harvesting plan (see Section 162-1503.D). Clearcutting or grubbing of trees is prohibited on very steep slopes.

2. Slopes shall be measured as the change in elevation over the horizontal distance between consecutive contour lines and expressed as a percent. For the purpose of application of these regulations, regulated slope shall be moderately and prohibitively steep slopes measured over three (3) or more two (2) foot contour intervals (six [6] cumulative vertical feet of slope). All slope measurements shall be determined by a topographic survey signed and sealed by a registered surveyor or engineer licensed to practice in the Commonwealth of Pennsylvania.

3. In steep slope areas, each building or structure shall be constructed in such a manner as to provide the least alteration necessary of the existing grade, vegetation, and natural soils condition. Excessive cut and fill shall be avoided. New roads and improvements to existing roads should be designed within the existing contours of the land to the extent possible and strive for compatibility with the character of rural roads.

4. Finished slopes of permitted cut and fill shall not exceed thirty-three (33) percent slope unless the applicant can demonstrate the method by which steeper slopes can be stabilized and maintained adequately.

5. All stockpiles of earth intended to be stored for more than twenty-one (21) days shall be seeded or otherwise stabilized to the satisfaction of the Township Engineer. Any disturbed area of very steep slopes or any cut and fill resulting in slopes of greater than twenty-five (25) percent shall be protected with an erosion control blanket.

6. Any disturbance of land shall be in compliance with the erosion and sedimentation control standards of Chapter 138, Subdivision and Land Development, Township stormwater management regulations, and Pennsylvania Department of Environmental Protection, Title 25, Chapter 102.

   a. An erosion and sedimentation control plan and soil stabilization plan shall be submitted consistent with the requirements of Chapter 138, Subdivision and Land Development, Township stormwater management regulations, and other applicable stormwater management regulations.

   b. The plan shall demonstrate how soil will be protected from erosion during construction and how soil will be stabilized upon the completion of construction.

7. Where the following information has not been previously submitted as part of the subdivision or land development plan application, such information shall be submitted to the Township with building permit, conditional use, special exception, zoning, or other permit applications, when applicable:

   a. The erosion and sedimentation control plans described in Subsection B.6 above.

   b. A grading plan shall be provided identifying the existing contours of the site, proposed finished grades, and the proposed location of all buildings and structures.

C. Woodland, hedgerow, and specimen vegetation protection standards.

1. Specimen vegetation.

   Specimen vegetation shall not be removed from any lot or tract except where the applicant demonstrates to the satisfaction of the Board of Supervisors that such removal is essential to eliminate a hazardous condition(s) or otherwise permit lawful use of the lot or tract and where no alternative exists; where permitted, removal of specimen vegetation shall be minimized. The desire to maximize development of a lot or tract shall not be adequate justification to remove specimen vegetation.

Specimen trees to be retained may be credited toward tree replacement required by Section 138-41.F of Chapter 138, Subdivision and Land Development.

2. Woodlands and hedgerows.

   a. Unless undertaken as an approved timber harvesting operation conducted in compliance with the requirements of Section 162-1503, the following disturbance limitations shall apply:

      1) For residential uses, no more than thirty-five (35) percent of woodlands shall be regraded, removed, built upon, or otherwise altered or disturbed; and

      2) For non-residential uses, no more than fifty (50) percent of woodlands shall be regraded, removed, built upon or otherwise altered or disturbed.

   b. In determining where permitted woodland disturbance will occur, the following factors shall be considered by the applicant and Township:

      1) The location(s) and benefit of conservation of healthy mature woodland stands shall be considered.

      2) Each building or structure shall be constructed in such a manner as to provide the least alteration or disturbance necessary of the existing woodland or hedgerow. Where possible, clearcutting shall be minimized and trees shall be selectively removed.

      3) Where possible, the remaining undisturbed woodlands and other vegetation shall interconnect with woodlands or wooded areas of adjacent properties to preserve continuous woodland corridors and allow for the normal movement, dispersion, and migration of wildlife. The applicant shall consider the impacts, in terms of functions and values to wildlife, of separating, dividing, or encroaching on wildlife travel corridors or extensive habitat areas, especially woodlands exceeding ten (10) acres in area.

      4) In each situation where the standards of this Section are applied, consideration shall be given to balancing the benefits of woodland preservation with other valuable resources on the site, including scenic views. The Township shall not unreasonably restrict woodland disturbance where limited disturbance may permit siting of buildings in less visually obtrusive areas of the tract.

3. Protection of woodlands and specimen vegetation to remain on site.

   Woodlands, hedgerows, individual trees, and other vegetation that are to remain on the site shall be identified on the plan and protected from land disturbance and construction activities in accordance with the tree protection provisions of Section 138-41.G, Protection of vegetation from mechanical injury and grading change, of Chapter 138, Subdivision and Land Development.

4. Tree replacement.

Tree replacement shall be required in accordance with the standards of Section 138-41.F, Conservation of woodlands and other vegetation, of Chapter 138, Subdivision and Land Development.

D. Timber harvesting regulations.

1. Timber harvesting operation shall only be undertaken in accordance with a timber harvesting plan approved by the Township.

a. All timber harvesting plans shall be submitted to the Township for review for compliance with the standards set forth herein not less than twenty-one (21) days prior to commencement of the timber harvesting operation. Within fourteen (14) days of submission of a timber harvesting plan to the Township, and based on review for compliance with the standards set forth herein, the Zoning Officer shall indicate to the applicant approval or denial of the submitted plan or approval subject to reasonable conditions.

b. The Township may retain a forester certified by the American Society of Foresters to review the timber harvesting plan and comment on its adequacy in meeting the intent of these regulations.

2. Timber harvesting plans submitted to the Township for review and approval shall include the following information:

a. Site location and boundaries of both the entirety of the property upon which the timber harvesting operation shall occur and the specific area proposed for timber harvesting;

b. Significant natural features on the property including steep slopes, wetlands, and riparian buffer zones;

c. Identification of specimen vegetation as defined by this Chapter;

d. Description of how long-term sustainability of the timber harvesting operation and regeneration of the woodlands will be achieved;

e. The general location of the proposed operation in relation to municipal and state highways and any proposed accesses to those highways;

f. Design, construction, maintenance, and retirement of the access system, including haul roads, skid roads, skid trails, and landings;

g. Design, construction, maintenance, and retirement of water control measures and structures such as culverts, broad-based dips, filter strips, and water bars; and

h. Design, construction, maintenance, and retirement of proposed stream and wetland crossings.

3. Any permits required by any other agency under any applicable regulation shall be the responsibility of the landowner or timber harvesting operator as applicable. Copies of all required permits shall be submitted to the Township prior to commencement of the timber harvesting operation.

4. The Township Engineer, Zoning Officer, and/or Township Forester shall be permitted access to the site of any timber harvesting operation before, during, or after active timber harvesting to review, inspect and ascertain compliance with the provisions set forth herein.

5. The following management practices shall apply to all timber harvesting operations:

   a. Felling or skidding across any public thoroughfare is prohibited without the express written consent of the Township or Penn DOT; whichever is responsible for the maintenance of said thoroughfare.

   b. No tops or slash shall be left within twenty-five (25) feet of any public thoroughfare or private roadway.

   c. Litter resulting from a timber harvesting operation shall be removed from the site before it is vacated by the operator.

   d. The operation shall not cause harm to the environment or any other property.

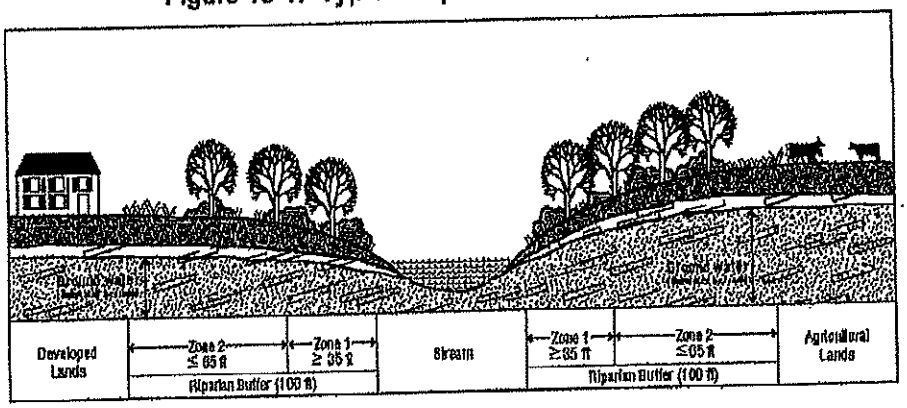
6. Timber harvesting operations shall not be permitted within any Zone One riparian buffer. Clearcutting or grubbing shall not be permitted within any Zone One or Two riparian buffer, the Flood Hazard District, or on very steep slopes.

7. Upon determination that a timber harvesting operation is in violation of these regulations, each day where any violation occurs shall constitute a separate violation subject to the provisions of this Chapter.

E. Watercourses/riparian buffers protection standards

1. The riparian buffer shall consist of two Zones: Zone One, Inner Riparian Buffer and Zone Two, Outer Riparian Buffer. The provisions of Subsections E.2 and E.3 below shall determine the specific widths of the individual riparian buffer zones. The total riparian buffer, consisting of Zone One and Zone Two, shall be a minimum of one-hundred (100) feet in width on each side of the watercourse; however, under specific circumstances, additional buffer width may be required in accordance with Subsection E.5 below.

Figure 15-1: Typical Riparian Buffer Scenario



2. Zone One – Inner Riparian Buffer. This zone shall begin at each edge of any identified watercourse and shall occupy a margin of land on each side, each with a minimum width of thirty-five (35) feet. The width of such margin shall be measured horizontally on a line perpendicular to the nearest edge of the watercourse at bankfull flow, as reviewed and approved by the Township Engineer.

Where prohibitively steep slopes (+25%) are located within or extend beyond the thirty-five (35) foot margin, Zone One shall be extended to include the entirety of the prohibitively steep slopes up to the total buffer width of one-hundred (100) feet on either side of the subject watercourse. Under such circumstances, the Zone One buffer may constitute the total riparian buffer and the restrictions of the Zone One buffer shall apply. With the exception of those uses or activities listed below, no woodland disturbance, land disturbance, or timber harvesting shall be permitted within the Zone One Riparian Buffer shall not be re-graded, filled, built upon or otherwise altered or disturbed:

a. Regulated activities permitted by the Commonwealth, Army Corps of Engineers or other Federal agency (i.e. permitted stream or wetland crossing);

b. Provision for unpaved trail and trail access;

c. Selective removal of hazardous or invasive alien vegetative species;

d. Vegetation management in accordance with an approved landscape plan or open space management plan;

e. A soil conservation project approved by the Chester County Conservation District; or

f. Removal of hazardous material or septic system, junk material, overhanging tree or diseased tree.

H. Qualifications. A licensed professional geologist or licensed professional civil engineer with expertise in geotechnical engineering shall review aerial photographs, soils, geologic and other related data available to him or her, as the data relates to the subject property in preparation of the Carbonate (Karst Geology) Study required by Section 404 of this Ordinance. The professional shall also conduct a site inspection of the property.

Section 528 Stormwater Management

All subdivisions and land developments shall provide for stormwater management consistent with the provisions of the Pennsbury Township Stormwater Management Ordinance as the same may be amended and/or re-adopted from time to time.

Section 529 Grading and Erosion & Sedimentation Control

A. Earth Disturbance Activities shall conform to all applicable requirements set forth in the Pennsbury Township Stormwater Management Ordinance and the Pennsbury Township Zoning Ordinance, as may be amended from time to time.

B. All Best Management Practices (BMPs) shall conform to the State Water Quality Requirements or any more stringent requirements which are applicable.

C. Post-construction water quality protection and the operation and maintenance of permanent stormwater BMPs shall be addressed as required by Article VI hereof.

D. Erosion and Sediment Control During Earth Disturbance Activities.

1. No Earth Disturbance Activity shall commence until approval by the Township of an Erosion and Sediment Control Plan and Final Subdivision or Land Development Plan with security provided as required by Article VI of this Ordinance. The Erosion and Sediment Control Plan shall comply with the following reference publications, as amended.

   a. 25 PA Code, Chapter 102, Erosion and Sediment Control, Section 102.4(b)(5).

   b. PADEP Erosion and Sediment Pollution Control Program Manual, March 2000, as amended from time to time.

2. The Erosion and Sediment Control Plan shall be prepared by a qualified professional, trained and experienced in erosion and sediment control methods and techniques.

3. A copy of the Erosion and Sediment Control Plan and any required permit shall be available at the project site at all times.

4. Evidence of any necessary permit(s) for Regulated Earth Disturbance Activity from the regional PADEP office or Chester County Conservation District must be provided to the Township prior to the commencement of any Earth Disturbance Activity for which any such permit may be required, where not provided prior to or at the time of final plan approval.

5. All graded or earth disturbance shall be stabilized, whether temporary or permanent, within ten (10) days of the initial ground breaking and, weather permitting, shall be watered, tended and maintained until growth is well established.

6. Erosion and Sediment Controls must be constructed, stabilized, and functional before site disturbance begins within the affected tributary.

E. Until the site is 70% stabilized, all erosion and sediment BMPs must remain in place and be maintained properly as determined by the Township. Maintenance must include inspections of all erosion and sediment BMPs after each runoff event and otherwise on a weekly basis. All preventive and remedial work, including cleanout, repair, replacement, regrading, reseeding, remulching, and renetting must be performed immediately. If erosion and sediment control BMPs fail to perform as expected, then immediate replacement BMPs or modifications of those controls previously installed is required.

F. All proposed earth disturbances shall comply with the following standards related to grading and earthwork:

1. Natural and/or existing slopes exceeding one (1) vertical unit to four (4) horizontal units shall be benched or continuously stepped into competent materials prior to placing all classes of fill. Cut slopes shall not exceed one (1) vertical unit to three (3) horizontal units.

2. Fills toeing out on natural slopes steeper than one (1) vertical unit to three (3) horizontal units shall not be made unless approved by the Township after receipt of a report by a soils engineer certifying that he/she has investigated the property and made soil tests and

that in his/her opinion such steeper slopes will safely support the proposed fill.

3. Fill areas shall be properly prepared prior to the placement of any new material. If excessive wetness, springs, or other seepage of water can be observed, drainage must be provided before placement of fill is undertaken. Under no circumstances shall fill be placed upon frozen ground or ground underlain by tree stumps, branches, or other vegetative material subject to rot or decomposition.

4. Fill shall begin at the lowest section of the area and spread in six-inch layers prior to compaction.

5. Each layer of fill shall be inspected prior to compaction. All roots, vegetation or debris must be removed and stones larger than six (6) inches in diameter must be removed or broken.

6. Where required by the Township upon the recommendation of the Township Engineer, each layer of compacted fill shall be tested to determine its dry density as per ASTM D1556, including its latest revisions. The density of each layer shall be not less than ninety-two (92) percent of maximum dry density for non-load bearing fill and ninety-five (95) percent of maximum dry density for load bearing fill, as determined by ASTM D1557. The moisture content of the compacted layer shall be not more than four (4) percent less or two (2) percent greater than the optimum moisture content as determined by ASTM D1557.

7. Where required by the Township, a qualified geotechnical engineer, or certified testing agency shall be required to inspect and certify all fill operations. A written report, by the geotechnical engineer or certified agency, shall be prepared and submitted to the Township detailing his, her or its findings respecting the fill operations and compliance with the terms of this Ordinance.

8. The top or bottom edge of filled or cut slopes shall be at least five (5) feet from property or right-of-way lines of roads in order to permit the normal rounding of the edge without encroaching on the abutting property or right-of-way line.

9. Adequate provisions shall be made for dust control.

10. All graded surfaces shall be seeded, sodded and/or planted or otherwise protected from erosion as soon as practicable and shall

be watered, tended and maintained until growth is well-established at the time of completion and final inspection.

11. Fills shall not encroach onto drainage and utility easements unless approval is obtained from all impacted parties, including but not limited to the Township and utilities which occupy the easement.

Section 530 Natural Resources Conservation

A. The requirements of Article XV, Natural Resource Protection Standards, of the Pennsbury Township Zoning Ordinance, Sections 162-1501 through 162-1505 shall apply to all subdivisions or land developments.

B. Conservation of woodlands and other vegetation.

1. Except in conjunction with routine property maintenance, the following regulation shall apply:

a. No wooded lot shall be disturbed except as follows:

i. For the purpose of logging or timber harvesting, in accordance with Section 162-1503 of the Pennsbury Township Zoning Ordinance and all other regulations applicable to land disturbance.

ii. For the purpose of subdivision and land development in accordance with this subsection, prior to construction of each dwelling unit or other building, the developer will stake in the field the location of the building foundation, driveway, and any utility easements to be constructed and cleared in the course of the said construction (the "prescribed area"). Following the placement of stakes, the developer will notify the Township and the Township will, following notification to the developer of the time for the same, conduct an inventory of trees greater than or equal to eight (8) inches in caliper at breast height located on the lot and no less than 10 feet from the staked construction. In order to facilitate this procedure, developer shall apply for building permits in groups of 10 neighboring dwelling units or buildings. Following construction, an inventory will again be conducted and, for each such tree materially damaged or removed or to be removed beyond the area prescribed as above (within ten (10) feet of area staked for construction), one or more trees of the

caliper size prescribed in the following table shall be planted in the place(s) designated by the Township and coordinate with landscape plans.

Minimum Number and Caliper of Tree to Be Removed	**Minimum Caliper of Tree To Be Planted as a Replacement**	
One, 8" to 12"	One, 4" to 4 1/2"	or two, 3 1/2"
One, 12" to 18"	One, 5" to 5 1/2"	or three, 3 1/2"
One, 18" to 24"	One, 6" to 6 1/2"	or four, 3 1/2"
One, greater than 24"	Two, 6" to 6 1/2"	or five, 3 1/2"

Refer to Appendix A for information on approved tree species and prohibited invasive species.

b. Evidence of tree replacement shall be provided in the form of a reforestation plan, prepared by a professional landscaper, which is part of the required landscape plan.

c. A professional landscaper selected by the Township shall have discretion to:

i. Require replacement of trees having a diameter at breadth height (dbh) of six inches or greater which are unhealthy or pose a safety hazard;

ii. Substitute vegetation other than trees for required tree planting;

iii. Substitute a larger caliper tree than indicated in Subsection 530.B.1.a.ii above, in accordance with Subsection 530.B.1.e below; and

iv. Substitute a greater number of smaller caliper trees in accordance with Subsection 530.B.1.a.ii above.

d. Design maintenance, and guaranty of such plantings shall be in conformance with Section 522 and Article VI of this Ordinance. Every effort shall be made to retain as much woodland as possible of a size and configuration which will promote its growth and natural regeneration.

e. In the event the required trees cannot be situated upon the property due to existing vegetation or some other circumstance, a larger size tree shall be planted as per

Subsection 530.B.1.c.iii above. However, if larger trees cannot be planted due to some site condition, then those required trees not located on the lot shall be planted at a site as directed by the Township.

f. Disturbance to vegetation other than woodlands which provides wildlife food and cover or visual amenity shall be minimized. This may include, but not necessarily be limited to, single or groups of specimen trees, hedgerows, formal gardens, and other vegetation not considered as woodland.

g. In the event grading will be performed on a site which shall result in the removal of the vegetation, as set forth in Subsection 530.B.1.f above, on the site at any time, a permit shall be required in accordance with the provisions of the Pennsbury Township Stormwater Management Ordinance, regardless of whether such a permit is otherwise required.

7. Disturbance or removal of vegetation occupying environmentally sensitive areas shall be undertaken only as permitted in an approved reforestation plan to minimize the adverse impacts of such actions. This shall include but not necessarily be limited to vegetation performing important soil stabilizing functions on floodplains, stream and pond banks, and areas of steep slope.

C. Protection of vegetation from mechanical injury and grading change.

1. All woody vegetation to be retained within 25 feet of a building site, parking area, or other proposed improvement shall be protected from equipment damage by snow fencing or other effective barriers approved by the Township; fencing or barriers around trees shall be placed at the dripline, unless determined to be appropriate at another location by the Township landscape architect.

2. Heavy equipment operators shall not damage existing tree trunks and root systems by driving heavy equipment within or otherwise disturbing the areas circumscribed by the dripline of any tree. In addition, roots shall not be cut or disturbed within the area circumscribed by the dripline of any tree. If there is no alternative to locating a utility line within the tree dripline, it is strongly encouraged that tunneling, rather than trenching, be used to minimize potential damage to tree root systems. In such cases, the professional landscaper selected by the Township shall determine the most desirable location for the survival of the tree(s). Where trenching is unavoidable, trenched holes shall be filled as soon as possible and tamped lightly to avoid the creation of air spaces.

8. Tree trunks or exposed roots damaged during construction shall be protected from further damage by fencing or other structural barrier. Treatment of damaged areas shall be dictated by the nature of the injury, e.g., damaged bark shall be cut back to a point where the bark is intact and tight to the tree; exposed roots shall be pruned back and covered with topsoil; tree limbs shall be cut back in proportion to root areas loss. Damage shall be pruned with a sharp instrument. All pruning implements shall be cleaned with isopropyl alcohol between work on each individual tree to eliminate the spread of pathogens. In such cases, the professional landscaper selected by the Township shall have the authority to determine the treatment technique(s) most suitable to the damaged area. In addition, where stipulated by the Township landscape architect, liquid or dry fertilizer shall be applied to trees with disturbed root zones to compensate for loss of roots.

4. Trees shall not be used for roping, cables, signs, fencing, or lighting. Nails and spikes shall not be driven into trees.

5. The area around the base of existing woody vegetation shall be left open. No impervious cover, storage of equipment, materials, debris, or fill shall be allowed within the dripline of any existing tree.

6. Grade changes to occur at any location on the property shall not result in an alteration to soil or drainage conditions which would adversely affect existing vegetation to be retained following site disturbance, unless adequate provisions are made to protect such vegetation and its root systems.

7. The professional landscaper selected by the Township may, at his discretion, required that specimen vegetation with significant historic, visual, or environmental qualities which would otherwise be removed during site preparation under the provisions of Subsection 530.B.1.a.ii above be transplanted elsewhere on the site.

8. Should any existing vegetation on the site not scheduled or permitted to be removed be irreparably damaged during site preparation and die within 24 months of the conclusion of site disturbance activities, such vegetation shall be removed and replaced with similar vegetation in accordance with the requirements of Section 522.E of this Ordinance.

ARTICLE VI
IMPROVEMENT GUARANTEES AND ACCEPTANCE

Section 600 Construction of Improvements

A. The Applicant shall construct and be responsible for (at no cost to the Township) all roads, streets, lanes or alleys, together with all other improvements, including grading, paving, curbs, gutters, sidewalks, trails, street lights, fire hydrants, water mains, street signs, shade trees, stormwater management facilities, sanitary sewers, landscaping, traffic control devices, open space and recreation areas, and erosion and sediment control measures in conformance with the final plan as approved, the applicable specifications and regulations of the Township, PennDOT and PADEP, and any other applicable regulations.

B. No occupancy permits for any building or buildings included in a subdivision or land development plan shall be issued by the Township Building Code Official until the Township Engineer provides written documentation that:

1. The roads, streets, or lanes providing access to and from existing public roads to such building or buildings have been improved to a mud-free, permanently passable condition by application of at least a base course thereon; and

2. That all other improvements depicted on the approved final plan, either upon the lot or lots or beyond the lot or lots in question and necessary for the reasonable use of or occupancy of any such building or buildings have been completed.

Section 601 Improvement Guarantee Requirements and Agreements

A. Before the Board of Supervisors shall approve final plans of any subdivision or land development and, as a requirement for approval thereof, the Applicant and developer shall either complete the improvements as required by Section 509(a) of the MPC or enter into a written agreement or agreements in the manner and form set forth by the Township, to guarantee the construction, installation and maintenance of all improvements required by this Ordinance at the Applicant's expense. The agreement(s) shall specify the following where applicable:

1. That the Applicant agrees that it will lay out, construct and maintain, at its expense, all roads, streets, lanes or alleys, together with all other improvements, including grading, paving, curbs, gutters, sidewalks, trails, street lights, fire hydrants, water mains, street

APPENDIX B
REQUIRED EARTH-MOVING PROCEDURES AND DESIGN STANDARDS FOR STORMWATER MANAGEMENT FACILITIES

Section I Cuts & Fills and Other Earth-Moving for Road Construction and Development Site Preparation

A. No cuts shall be made for access to a subdivision or land development site from an arterial or collector road unless excess runoff from the access road will be detained on the property and no runoff from the access road will flow onto the arterial or collector road.

B. Cuts or fills may be made in the interior of a subdivision or land development or individual site only under the following conditions:

1. The finished slope of a cut shall not exceed one (1) foot vertical for three (3) feet horizontal and the finished slope of fill shall not exceed one (1) foot vertical for three (3) feet horizontal (depending on soil types - see Appendix D), and such slope is immediately stabilized with temporary and permanent grasses, other vegetation, and mulching;

2. When the face of a cut is stone, the cut may exceed 1 in 2 if the Township Engineer determines that the rock face will not be subject to erosion and constitute a safety hazard;

3. For any slope exceeding 1 in 3 which does not consist of stable rock fill, the Township Engineer shall require retaining walls or terraces appropriate to the degree of hazard;

4. No fill shall be permitted within twenty feet of a stream bank except for the construction of a road crossing (it is further understood that flood plain regulations and Pennsylvania DEP's encroachment regulations may further restrict such fills);

5. Fill may be placed over a spring if measures are taken to convey the water beyond the fill.

C. Where a construction access road or future street intersects an existing public right-of-way, a minimum of 35' of PA 3A crushed rock with a base thickness of six (6) inches or a suitable alternative material for tire cleaning of construction vehicles shall be installed prior to use of the access road by construction vehicles.

D. All cut or fill areas shall, within fifteen days of completing the cut or fill operation, be brought to final grade and stabilized with temporary or permanent grasses or other materials appropriate to the time of disturbance and the site conditions.

E. Whenever fill is added, vegetation is stripped, or no established vegetation exists on slopes exceeding eight percent (8%), the Township Engineer may require the installation of temporary diversion channels and berms above and below unstabilized areas at intervals appropriate to the percentage of slope. In designing such diversions, consideration in locating them should be given to their potential conversion not permanent diversion or detention facilities. Care should be taken to avoid destruction of trees and shrubs when designing, and installing, these facilities. Discharge from the channels shall be directed to detention basins.

Section II Construction of Detention or Retention Basin

A. Basins when used shall be installed prior to or concurrent with any earth-moving or land disturbances which they will serve. The phasing of their construction shall be noted in the narrative and on the plan.

B. Soil requirements:

1. Basins shall only be located on soils permitted for such use as designated in Appendix D.

2. Soils used for the construction of basins should be stable soils.

3. Detention basins designed to hold the excess volume of runoff from a two-year storm should be located on soils with a high percolation rate [as indicated in Appendix D, Soils Use Guide, under Infiltration Rate] in order to encourage rapid recharge and reduce potential for stagnant water conditions. As soils with high percolation rate are found at higher elevations of a site, these detention facilities may require incorporation into building lot layout. Drainage easements and deed restrictions against the alteration of such detention areas shall be provided in compliance with Article VIII and Appendix B, Section V, of this ordinance.

C. Energy dissipaters and/or level spreaders shall be installed at points where pipes or drainage ways discharge to or from basins. Outlet pipes designed to carry the pre-development two (2) year storm discharge will be permitted to discharge into a stream with only an energy dissipater. Storm discharges from a ten (10) year or greater intensity storm should be spread across floodplains by level spreaders, rock material found on the site is suggested for their construction

D. The following slope restrictions shall be applied to basins.

1. Exterior slopes of compacted soil shall not exceed one (1) foot vertical to three (3) feet horizontal and may be further reduced if the soil has unstable characteristics as noted in Appendix D, Soil Use Guide.

2. Interior slopes of the basin shall not exceed one (1) foot vertical in three (3) feet horizontal except:

   a. Were maximum water depth will not exceed three (3) feet, or

   b. When a two-inch rainfall in one-hour will not fill the basin in one hour, or

   c. That, where interior slopes will be one (1) foot vertical to two (2) feet horizontal or steeper, the basin shall be fenced by a permanent wire fence forty-wo (42) inches in height and an access road of durable non slip materials shall be constructed for access into the basin

E. Outlet structures within basins which will control peak discharge flows and distribute the flows by pipes to discharge areas shall be constructed of concrete, steel or aluminum and shall have child-proof non-clogging trash racks overall design openings exceeding twelve inches (12") in diameter except those openings designed to carry perennial stream flows. Where spillways will be used to control peak discharges in excess of the ten (20) year storm, the control weirs shall be constructed of concrete of sufficient mass and structural stability to withstand the pressures of impounded waters and out-let velocities. Concrete outlet aprons shall be designed as level spreaders and shall extend, as a minimum, to the toe of the basin slope. The incorporation of large stones found on the site into the concrete apron to provide a more natural appearance is suggested. Construction shall comply with PennDOT Form 408 Specifications.

F. Inlet and outlet structures will be located at maximum distance from one another. The Township Engineer may require a rock filter berm or rock-filled gabions between inlet and outlet areas when the distance is deemed insufficient for sediment trapping. All inlets shall either be located above the bottom of the basin or shall discharge to areas of the basin which slope downward to lower elevations of the basin.

G. Emergency spillways shall be provided and shall be designed to provide maximum protection against erosion due to overtopping. The Township Engineer shall require the use of concrete lattice blocks, stone rip-rap, or concrete spillways when slopes would exceed one (1) to four (4) and

spillway velocities might exceed USGA-NRCS standards for the particular soils involved. (Standards are contained in Chester County Conservation District's Environmental Protection Handbook, Charts on page 10).

H. Temporary and permanent grasses or stabilization measures shall be established on the sides of all earthen within fifteen (15) days of construction. Stabilization shall include reapplication of 6 inches of top soil.

Section III Building Site Evaluation and Surface Runoff

A. If temporary or permanent diversion channels or berms have not been established during general site preparation (as noted in Section I-E above), diversion channels or berms shall be installed whenever slopes exceed ten percent (10%) above or below proposed excavation areas, Installation shall occur prior to or concurrent with excavations or other earth-moving on the uphill or downhill sides of the building location and any other areas to be disturbed. This requirement may be waived if it would result in the destruction of trees and shrubs. In all cases, bay bales shall be installed and maintained downhill of all excavations and until the diversion channels or berms required by the Township Engineer have been stabilized

B. Earth excavated for foundations or other reasons should be used for construction of diversion berms or decentralized detention basins

C. All exposed earth shall be stabilized with appropriate grasses or other materials no later than fifteen after disturbance.

Section IV Construction Vehicle Parking

One access route to the construction site for contractors' vehicles should be established. During construction, vehicles should be parked on the street or road except: when the vehicle is specifically required in construction for delivery of materials; when distances to the construction area would be unreasonable; or where roadway parking would constitute a traffic hazard.

Section V Storm Sewers, Drainage Swales and Perennial Streams

A. General Design

1. Properly designed, graded, and turfed drainage swales shall be encouraged in lieu of storm sewers in residential areas and, where approved by the Township Engineer, in commercial and industrial areas.

2. Storm sewer systems for conveyance of storm water where deemed necessary shall be designed to accommodate a 10, 25, or 50-year storm depending on the severity of slopes of their catchment areas (0-8%, 8-15%, 15-25%, respectively), the grade of the path of any overflows from inlets, and the judgment of the Township Engineer. All perennial stream crossing will require 100-year design for culverts and/or bridges.

B. Specific Design Criteria for Storm Sewers

1. Storm sewers, where necessary, shall be placed within the street right-of-way. When located in undedicated land, they shall be placed within an easement not less than twenty-five (25) feet wide as approved by the Township Engineer.

2. Storm sewers shall have a minimum diameter of fifteen (15) inches for reinforced concrete pipe, and a minimum grade of one percent (1%). Changes in alignment shall be by straight sections connected by inlets at manholes. Rainfall intensity curves and other hydrologic/hydraulic design data, provided by the Pennsylvania Department of Transportation and/or the USDA-NRCS, shall be used for design purposes.

3. Manholes shall be not more than three hundred (300) feet apart on sizes up to twenty-four (24) inches, and not more than four hundred and fifty (450) feet apart on greater sizes. Inlets may be substituted for manholes on approval by the Township Engineer.

4. Inlets, manholes, covers and frames shall conform to Pennsylvania Department of Transportation specifications. At street intersections, inlets shall be placed in the tangent and not in the curved portion of the curbing.

5. The Township shall be granted a twenty-five (25) foot wide drainage easement over all storm sewers, and the distances from any dedicated road to all detention and retention basins, to provide unobstructed access to township personnel for purposes of maintenance and repair.

C. Specific Design Criteria for Drainage Swales and Perennial Streams

1. Where drainage swales are used, they shall be designed to carry the required discharge without excessive erosion, and also to

increase the time-of-concentration, reduce the peak discharge and velocity, and permit the water to percolate into the soil

2. Easements shall be required on property(ies) containing drainage swales and/or perennial streams These deed restrictions shall specify that no property owner obstruct or alter any drainage swale or perennial stream identified in the storm water management plan if such action would after the natural course of runoff, and/or negatively impact abutting landowners.

Section VI Design of Infiltration Pits and Infiltration Trenches for Infiltration of Roof Drainage

A. Runoff control capacity may be distributed among several infiltration pits, trenches, or other infiltration practice so long as total assimilative capacity of all structures equals the amount required above.

B. Infiltration pits connected to roof drains should be located at least ten feet from basement walls and downhill from the building in the direction of ground water flow. A location uphill from wells is considered advantageous.

C. The bottom of an infiltration pit should be at least two (2) feet above seasonal high water table and good bedrock or be shown to be otherwise capable of handling required design volumes.

D. Infiltration pits or infiltration trenches shall be kept away from steep man-made grades.

E. The use of a "drip strip: or porous pipe leading to the seepage pit is encouraged, provided that a safe distance from structures is maintained.

F. In all cases, an overflow system should be provided to accommodate heavy rains in excess of the design criteria.

G. Infiltration pits or the drains to them must contain a sediment trap which can be maintained regularly. All downspouts should have leaf strains to prevent leaves from clogging the infiltration pit.

APPENDIX C
ADDITIONAL CRITERIA TO GUIDE DESIGN OF EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT FACILITIES

Section I References to be Used re: Design Criteria & Procedures

Except as specifically provided in Appendix B, design criteria and procedures for computing rainfall frequencies and for developing erosion and sediment control and storm water management facilities and practices shall be those included in:

A. The Erosion and Sediment Pollution Control Program Manual. PADEP #466. Bureau of Land and Water Conservation of the Pennsylvania Department of Environmental Protection. January, 1996

B. Design Procedures for Rainfall Duration and Frequency in Pennsylvania. Publication #65, Institute for Research in Land and Water Resources, Pennsylvania State University, August 1970.

C. Pennsylvania Handbook of Best Management Practices for Developing Areas. CH2M Hill for the Pennsylvania Association of Conservation Districts and Agencies. 1998.

D. Conservation Design for Stormwater Management: A Design Approach to Reduce Stormwater Impacts from Land Development. Delaware Department of Natural Resources and Environmental Control and the Brandywine Conservancy, Dover, Delaware. 1997.

Section II Soil Use Guide

The criteria in the Soil Use Guide on the following two pages shall be followed in the design of temporary and permanent erosion and sediment control, and storm water management facilities. It is based on an analysis of the Soil Survey of Chester and Delaware Counties, conducted by the NRCS (Natural Resources Conservation Service of the USDA) and reflects the Township's intent to protect valuable ground and surface water resources from pollution and depletion and to control erosion and sedimentation.

SOIL USE GUIDE						
Soil Type	Retention/Detention Basin Location	Use of Soil for Construction of Basin Walls	Erosion Potential Affects [Emergency spillway design & velocities of channels, etc.]	Infiltration Structures	Infiltration Rate for Calculating Pit or Trench Size	Diversion Terraces or Berms & Interceptor Channels [Max. flow rates and grade]
Edgemont	Not Recommended when high pollution risk. See 1 & 3 below	High permeability suggests restricting slopes 1 to 3	Low	Highly recommended	2" per hour	
Manor	Same as above	High permeability and instability suggest restricting slopes 1 to 3 or greater and embankment heights to less than ten feet	High	Highly	2" per hour	1.5 fps [feet per second] 1% grade
Chester	Can be used where "Recommended" soil not available. See 2	High permeability suggests restricting slopes to 1 to 3	Moderate at grade. High when stripped of topsoil	Recommended	1.2" per hour	2.0 fps at 1.5% grade
Neshaminy	Same as above	High permeability and instability suggests restricting slopes to 1 to 3	Moderate	Recommended	1.2" per hour	
Hagerstown	Same as above	Stable, no permeability problems	Moderate	Recommended	1.2" per hour	
Glenelg	Same as above	High permeability suggests restricting slopes to 1 to 3	Moderate at grade. High when stripped of topsoil	Recommended	1.2" per hour	2.0 fps at 1.5% grade
Bedford	Recommended	Stable, no permeability problems	Moderate	Generally not recommended SHWT at 2-3 ft.		
Glenville	Recommended	Some permeability problems	High at grade. Moderate at 4 ft. depth	Not recommended. SHWT at 1-1.5 ft.		1.5 fps 1% grade
Lawrence	Recommended	Instability suggests restricting slopes to 1 to 3	Moderate	Generally not recommended SHWT at 1-2 ft.		

Congaree	Recommended [except as noted in 4 below]	Same as above	Moderate	Not recommended		1.5 fps at 1% grade
Chewacla	Recommended	Some stability problems	High	Not recommended		1.5 fps at 1% grade
Guthrie	Recommended	Instability suggests restricting slopes to 1 to 3	Moderate	Not recommended SHWT at 0-.5 ft.		
Worsham	Recommended	Stable soil	Moderate	Not recommended		2.0 fps at 2% grade
Wehadkee	Recommended [except as noted in 4 below]	Stable soil	Moderate	Not recommended		2.0 fps at 2% grade

1. Due to high infiltration rates, if recommended soils are available on a site, this soils is not recommended for detention basins which will handle normal runoff from streets, parking areas, and other locations which might have major pollutants present. The soil may be used for detaining water from other areas, however. Where detention basins for street areas, etc., must be built in Manor soils, the top ten inches of soil should usually be removed first.

2. Edgemont soils have high permeability, suggesting some risk for high embankments of detention basins.

3. Infiltration rates for these soils are relatively high, consequently runoff poses some risk although somewhat less in general than the Manor and Edgemont soils.

4. This soils is an alluvial soil frequently found in flood plains and high water areas. Since the Township's flood plain regulations restrict structures in many of these soil areas, reference must be made to the flood plain map and the ordinance to determine whether a basin may be built at a particular location, High water tables in this soil will require basins above ground level, since an excavated area would frequently be filled with water.