

ARTICLE EIGHT
SPECIAL STUDIES AND REPORTS

Section 800. Applicability

The following special studies or reports to be developed by qualified professionals may be required to support and justify subdivision and land development proposals as required by this Ordinance and the Zoning Ordinance.

Section 801. Traffic Management Study

Commented [NM1]: This is from your current SALDO, Article II Submission of Plans.

- A. Applicability and purpose. A traffic management study shall be required for all major subdivisions, land developments and rezoning requests as described in the Springfield Township Code. This study and report will enable Springfield Township to assess the effect of a proposed: 1) subdivision, 2) land development or 3) rezoning request on the transportation system in Springfield Township. The purpose of the study is to ensure that proposed developments or zoning changes do not adversely affect the transportation network, to identify any traffic problems associated with site access and to determine traffic problems on Township, county or state roads in the study area of the proposed project. The study also will assist in the protection of air quality, the conservation of energy and the safety of the motoring public. The study shall also present specific determination of necessary traffic control signing (i.e., stop signs, speed limit signing, warning signs, no parking signs, etc.), conforming to Pennsylvania Consolidated Statutes, Title 75, and applicable Township requirements.

B. Definitions. The following definitions are applicable to the provisions of this section:

Commented [NM2]: From MCPC Model SALDO

1. Public Transportation. Transportation service for the public provided by a common carrier of passengers generally on a regular route basis or a private operator offering service to the public.
2. Study Area. This area will extend approximately one-half (1/2) mile along adjacent roadways in all directions from all access points or the first major intersection along these roadways. Where doubt exists as to the appropriate boundaries, the traffic engineer shall seek guidance from the Township Engineer prior to the submission of the Traffic Impact Study.
3. Major Intersection. Any intersection where traffic generated by the proposal will have a significant impact and/or any other intersection involving an arterial road. Where doubt exists as to whether an intersection should be included in the study, the traffic engineer shall seek guidance from the Township Engineer prior to the submission of the Traffic Impact Study.
4. Volume/Capacity Analysis. This procedure compares the volume of a roadway or intersection approach to its capacity (maximum number of vehicles that can pass a given point during a given time period). The procedures described in the latest version of the Highway Capacity Manual published by the Transportation Research Board shall be followed.

- 5. Trip Generation Rates. The total number of vehicles to and from a study site per unit of land use as measured by parameters such as dwelling units, acres, etc.
- 6. Queue Analysis. This procedure includes the average queue and maximum queue of vehicles that will be observed in each traffic stream and intersection approach, measured in both feet and vehicles. Various statistical and/or computer models may be applied.
- 7. Warrants for Traffic Signal Installation. The minimum traffic or pedestrian volumes or other criteria necessary for the installation of a traffic signal. These warrants are contained in the Manual on Uniform Traffic Control Devices for Streets and Highways, U.S. Department of Transportation, Federal Highway Administration, 2003, as amended, or the most recent version, whichever is later.

C. Conduct of traffic management study.

- 1. The Township shall select a qualified traffic engineer and/or transportation planner with previous traffic study experience to prepare and review traffic management studies. The subdivision and/or land development applicant shall select a qualified traffic engineer and/or transportation planner with previous traffic study experience to prepare traffic management studies. The traffic engineer/planner for the applicant shall, prior to undertaking a traffic management study, submit a sketch plan of the planned development and, together with the Township traffic engineer/planner, set the scope of the traffic management study. The traffic engineer/planner for the applicant shall conduct the traffic management study. If, in the judgement of the traffic engineer/planner for the Township, additional traffic data or analysis is required, the traffic engineer/planner for the Township may collect the traffic data and perform the additional analysis. The applicant shall be responsible for all costs incurred for its traffic engineer/planner and all costs incurred by the Township for services provided by its traffic engineer/planner. The estimated costs for the traffic engineer/planner for both the applicant and Township shall be guaranteed in a method consistent with this chapter.
- 2. Subdivisions, ~~and~~ land developments and conditional use applications for which study is required.
 - a. A traffic management study shall be required for all subdivisions and land developments that meet one or more of the following criteria:
 - 1) Residential: five or more dwelling units.
 - 2) Commercial: a commercial building or buildings consisting of 5,000 square feet or more of gross floor area or when Chapter 114 of the Springfield Township Code, entitled "Zoning," requires 50 or more parking spaces for the proposed use.
 - 3) Office: a development consisting of 5,000 square feet or more of gross floor area or when Chapter 114 of the Springfield Township Code, entitled "Zoning," requires 50 or more parking spaces for the proposed use.
 - 4) Industrial: a development consisting of 20,000 square feet or more of gross floor area or when Chapter 114 of the Springfield Township Code, entitled "Zoning," requires 50 or more parking spaces for the proposed use.
 - 5) Institutional: a development consisting of 2,000 square feet or more of gross floor area or when Chapter 114 of the Springfield Township Code, entitled "Zoning," requires 50 or more parking spaces for the proposed use.

Commented [NM3]: From MCPC Model SALDO/Abington Draft SALDO: 1. Generate 3,000 average trips per day; 2. Generate 100 or more vehicle trips entering or exiting per hour; 3. Generate 100 or more additional vehicle trips in a redevelopment site; or 4. Sites that do not meet the three criteria, but in the opinion of [municipal governing body may have a significant impact on traffic flow and safety. 5. It would be located on a site that is or would be greater than 1 acre in size. 6. It would generate an increase in peak-hour traffic greater than 5% of the existing volume to surrounding residential communities. It would have daily trip generation rates greater than 500 trips per 1,000 square feet of gross leasable floor area.

- b. The Board of Commissioners, at its discretion, may request the preparation of a traffic management study for any other subdivision or land development not cited above.
 - c. The Board of Commissioners shall have the discretion to require the posting of additional moneys in escrow, by the applicant, for the preparation of a traffic management study for any other subdivision or land development not cited above.
- D. General requirements and standards for traffic management study. A traffic management study shall follow the outline in Subsection D.1 "Traffic management study outline" and traffic management report guidelines contained in Subsection D.2 "Traffic management study report guidelines."
- 1. Traffic management study outline.
 - a. Introduction.
 - 1) Site and study area boundaries.
 - 2) Existing and proposed site uses.
 - 3) Existing and proposed nearby development.
 - 4) Existing and proposed roadways and intersections.
 - b. Analysis of existing conditions.
 - 1) Daily (weekday and Saturday) peak-hour traffic volumes.
 - 2) Volume/capacity analysis at critical points.
 - 3) Levels of service at critical points.
 - 4) Past two years of crash analysis.
 - c. Analysis of future conditions without proposed development.
 - 1) Daily (weekday and Saturday) peak-hour traffic volumes.
 - 2) Volume/capacity analysis at critical points.
 - 3) Levels of service at critical points.
 - d. Trip generation.
 - e. Trip distribution.
 - f. Traffic assignment.
 - g. Analysis of future conditions with the proposed development.
 - 1) Daily (weekday and Saturday) peak-hour traffic volumes.
 - 2) Volume/capacity analysis at critical points.
 - 3) Levels of service at critical points.
 - h. Multiple phases.
 - i. Recommended improvements.
 - 1) Proposed recommended improvements.
 - 2) Volume/capacity analysis at critical points.
 - 3) Levels of service at critical points.
 - j. Conclusions.
 - 2. Traffic management study report guidelines. The report made after the study shall be in the following format and contain the following information unless any part of the following requirements is specifically waived by the Board of Commissioners.
 - a. Introduction. The objective of this section is to clearly identify the site and use and transportation setting for the site and its surrounding area.

Commented [NM4]: From MCPC Model SALDO: "This area will extend approximately one-half (1/2) mile along the adjacent roadways in all directions from all access points or the first major intersection along these roadways. Where doubt exists, the traffic engineer shall seek guidance from the [municipality] Engineer prior to the submission of the Traffic Impact Study."

The existing Springfield requirements say that the township engineer and developer's engineer shall set the scope of the study [§801.B.1]. This may address study area boundaries, although it could be made clearer. In either case, we might use the MCPC model text as a default, with modifications allowable based upon discussions of the township's and developer's engineer.

Commented [MN5]: From MCPC Model SALDO/ Draft Abington SALDO

- 1) Site and study area boundaries. A brief description of the size, location, general terrain features, proposed land uses, construction staging and completion date of the proposed land development shall be provided. If the development is residential, types of dwelling units and number of bedrooms shall be included. Also, the description shall include probable socioeconomic characteristics of site users with respect to transportation needs of the site (i.e., number of senior citizens).
 - 2) Existing and proposed site uses. The existing and proposed uses of the site shall be identified in terms of type and zoning classification category.
 - 3) Existing and proposed nearby uses. A complete description of the existing land uses in the vicinity of the site as well as their current zoning, proposed uses for adjacent land and other major existing and proposed land development shall be provided.
 - 4) Existing and proposed roadways and intersections. The description shall contain full documentation of the proposed internal and existing external transportation system. This description shall include proposed internal vehicular bicycle and pedestrian circulation, all proposed ingress and egress locations, all internal roadways (widths and rights-of-way), parking conditions, traffic channelization and any traffic signals or other intersection control devices at all intersections within the site. Also, locations for all signing (i.e., speed limits, etc.) shall be shown and verified. The report shall describe the entire external roadway system within the study area. Major intersections in the study area shall be identified and illustrated. All existing and proposed public transportation services and facilities within a one-mile radius of the site shall also be documented. All future highway improvements within Springfield Township and the study area, including proposed construction and traffic signalization, shall be noted. Improvements cited within the most recent Springfield Township Comprehensive Plan shall be referenced. Improvements from the Pennsylvania Department of Transportation's twelve-year Highway and Bridge Program, within Springfield Township and the study area, shall also be noted. Any proposed or in-place roadway improvements due to proposed surrounding developments shall be noted.
- b. Analysis of existing conditions. This section shall describe the results of the volume/capacity analysis to be completed for the roadways and intersections in the study area under existing conditions as well as any data collection efforts that are required.
- 1) Daily and peak-hour volumes. Schematic diagrams shall be presented depicting existing traffic volumes for average daily traffic (ADT), the weekday peak highway traffic hour(s) and peak development-generated hour(s) and the Saturday peak traffic hour. All documentation must be contained in the report. Turning movement and mainline volumes shall be presented for all peak-hour conditions (weekday a.m. peak, weekday p.m. peak, weekday site-generated and Saturday peak) while only mainline volumes are required for ADTs. Source and method of computation must be included.
 - 2) Volume/capacity analysis at critical points. A volume/capacity analysis based upon existing volumes shall be performed during the weekday and Saturday peak traffic

Commented [NM6]: Definitions. The following definitions are applicable to the provisions of this section:

1. Public Transportation. Transportation service for the public provided by a common carrier of passengers generally on a regular route basis or a private operator offering service to the public.
2. Study Area. This area will extend approximately one-half (1/2) mile along adjacent roadways in all directions from all access points or the first major intersection along these roadways. Where doubt exists as to the appropriate boundaries, the traffic engineer shall seek guidance from the Township Engineer prior to the submission of the Traffic Impact Study.
3. Major Intersection. Any intersection where traffic generated by the proposal will have a significant impact and/or any other intersection involving an arterial road. Where doubt exists as to whether an intersection should be included in the study, the traffic engineer shall seek guidance from the Township Engineer prior to the submission of the Traffic Impact Study.
4. Volume/Capacity Analysis. This procedure compares the volume of a roadway or intersection approach to its capacity (maximum number of vehicles that can pass a given point during a given time period). The procedures described in the latest version of the Highway Capacity Manual published by the Transportation Research Board shall be followed.
5. Trip Generation Rates. The total number of vehicles to and from a study site per unit of land use as measured by parameters such as dwelling units, acres, etc.
6. Queue Analysis. This procedure includes the average queue and maximum queue of vehicles that will be observed in each traffic stream and intersection approach, measured in both feet and vehicles. Various statistical and/or computer models may be applied.
7. Warrants for Traffic Signal Installation. The minimum traffic or pedestrian volumes or other criteria necessary for the installation of a traffic signal. These warrants are contained in the Manual on Uniform Traffic Control Devices for Streets and Highways, U.S. Department of Transportation, Federal Highway Administration, 2003, as amended, or the most recent version, whichever is later.

hour(s) and the peak development-generated hour(s) for all roadways and major intersections in the study area.

- 3) Levels of service at critical points. Based on the results obtained in the previous section, levels of service are to be computed and presented in schematic form. Included in this section shall also be a description of typical operating conditions at each level of service.
- c. Analysis of future conditions without the proposed development. This section shall describe the anticipated traffic volumes in the future and the ability of the roadway network to accommodate this traffic without the proposed development. The future year(s) for which projections are made shall be the development completion year unless required otherwise by the Springfield Township Board of Commissioners. Factors included within this section include, but are not limited to, background traffic growth expansion and traffic generated by other proposed development as well as associated improvements.
- 1) Daily and peak-hour traffic volumes. This section shall clearly indicate the method and assumptions used to forecast future volumes in order that Township personnel can duplicate these calculations. The schematic diagrams depicting future volumes shall be similar for those described previously in Subsection **D.1** "Traffic management study outline" in terms of location and times (daily and peak hours).
 - 2) Volume/capacity analysis at critical points. The ability of the roadway system to accommodate future traffic (without the proposed development) is to be described in this section. If roadway improvements or modifications are committed for implementation, the volume/capacity analysis should be presented for these conditions. Periods of analysis shall be presented for these conditions. Periods of analysis shall be the same as those previously performed in Subsection **D.2.b.2)**. "Analysis of existing conditions: Volume/capacity analysis at critical points."
 - 3) Levels of service at critical points. Based on the results obtained in the previous section, levels of service are to be determined and presented as in Subsection **D.2.b.3)** "Analysis of Existing Conditions: Level of service at critical points."
- d. Trip generation. The estimation of vehicular trips to result from the proposal shall be completed for average weekday, average Saturday, peak traffic hours during the weekday a.m. and p.m. peak traffic hours, the weekday peak development-generated hour and the Saturday peak traffic hour. These development-generated traffic volumes shall be provided for the inbound and outbound traffic movements as estimated, and the reference source(s) and methodology followed shall be documented. Any characteristics of the site which may cause particular trip generation problems shall be noted.
- e. Trip distribution. The direction of approach for site-generated traffic will be presented in this section for the appropriate time periods. As with all technical analysis steps, the basic method and assumptions used in this work must be clearly stated in order that Township officials may replicate these results.
- f. Traffic assignment. This section describes the utilization of study area roadways by site-generated traffic. The proposed traffic volumes shall be combined with anticipated traffic

volumes as calculated under Subsection I(3)(b)[4] "Traffic management study outline" to describe mainline and turning movement volumes for future conditions with the site developed as proposed. Traffic volumes shall be assigned to individual access points. If school crossings are to be used, pedestrian volumes shall be assigned to each crossing.

- g. Analysis of future conditions with the proposed development. This section describes the adequacy of the roadway system to accommodate future traffic with development of the site.
 - 1) Daily and peak-hour traffic volumes. Mainline and turning movement volumes shall be presented, in schematic form, for the highway network in the study area as well as driveways and internal circulation roadways for the appropriate time periods (identified previously).
 - 2) Volume/capacity analysis at critical points. Similar to Subsections I(3)(b)[2][b] "Volume/capacity analysis at critical points" (for existing conditions) and I(3)(b)[3][b] "Volume/capacity analysis at critical points" (for future conditions) a volume/capacity analysis shall be performed for the appropriate peak hours for future conditions with the site developed as proposed.
 - 3) Levels of service at critical points. Based upon the results obtained in the previous section, levels of service are to be determined and presented as in Subsections I(3)(b)[2][c] "Level of service at critical points" (for existing conditions) and I(3)(b)[3][c] "Level of service at critical points" (for future conditions).
- h. **Multiple Phases.** If the proposed subdivision or land development will occur in multiple phases, then calculations for the completion of each phase shall be provided in the Study.
- i. **Recommended improvements.** A description of proposed improvements to remedy deficiencies shall be included in this section. Improvements shall be identified which would replace capacity and/or return predevelopment levels of service conditions. Alternative improvement schemes shall be presented for post-development traffic volumes to operate at a minimum Level of Service D or in no circumstances at a level of service worse than predevelopment levels. These recommendations shall separately identify committed projects of governmental agencies which were described and independently identified in Subsection I(3)(b)[1][d] and reflected in the analysis contained in Subsections I(3)(b)[3] "Analysis of future conditions without the proposed development" and I(3)(b)[7] "Analysis of future conditions with the proposed development."
 - 1) Proposed recommended improvements. This section should describe the location, nature and extent of proposed improvements to assure sufficient capacity. The listing of recommended improvements shall include, but not be limited to, the following elements: internal circulation design, speed limit, stop and no-parking sign locations, site access location and design, external roadway and intersection design and improvements, and traffic signal installation and operation, including phasing and timing. All physical roadway improvements shall be shown in sketches. This listing shall also include, for each improvement, preliminary cost estimates, funding source,

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Commented [MN8]: From draft Abington SALDO (this incorporates recommendations from transportation engineers):
Mitigation.

- a.If evaluation ... indicates that the overall intersection LOS has dropped, the applicant will be required to mitigate the LOS if the increase in overall intersection delay is greater than 10-seconds.
- b.If the overall intersection delay increase is less than or equal to 10-seconds, mitigation of the intersection will not be required.
- c.If the intersection LOS meets the level of service requirements, applicants may still be required to provide mitigation to address critical lanes or approaches.
- d.For locations where the level of service of ... is LOS F and with development, the delay increases more than 10 seconds, the remedies shall provide an estimated delay that will be no worse than the delay for the design year without the development.
- e.The Township may also request the applicant to mitigate critical movements or approaches and perform additional analysis. Any alternatives or suggested phasing of improvements shall be described. The mitigation measures may include recommendations such as roadway widening, turning lanes, deceleration lanes/tapers, changes to signalization, use of access management techniques, or a reduction in the proposed intensity of the use. The responsibility and timing of all recommended roadway improvements shall be described within the traffic impact study. Any mitigation measures implemented by the applicant shall be undertaken consistent with PennDOT guidelines.

timing and likelihood of the improvement implementation and the party responsible for the improvement.

- 2) Volume/capacity analysis at critical points. Another iteration of the volume/capacity analysis shall be presented and described which demonstrates the anticipated results of making recommended improvements.
- 3) Levels of service at critical points. Based on the results obtained in the previous section, levels of service for the study area with improvements shall be presented.
- 4) Street Improvements. The Study shall include recommendations for street improvements bordering the site that will be used to accommodate the traffic generated by the proposed subdivision or land development; and cost estimates for the associated recommendations.

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- j. Conclusions. The last section of the study shall be a clear, concise description of the study findings. It is anticipated that this concluding section should serve as an executive summary.

E. Time of submission.

1. Submission to township secretary. The traffic management study shall be submitted to the Township Secretary with the preliminary plan application or the petition for rezoning, as the case may be. An application for preliminary plan approval shall be deemed incomplete and unacceptable for filing if the traffic study is not included in the submission, and the time period for approval of such plans pursuant to Section 508 of the Pennsylvania Municipalities Planning Code, 53 P.S. § 10508, shall not commence until the study is received by the Township Secretary. A petition for rezoning will not be accepted or scheduled for hearing until the traffic management study is received.
2. Submission to emergency responders. The township shall submit all land development plans to the fire department, police department, and any other emergency response organization having jurisdiction within the area of the proposed development for review and comment. If requested by them, the Board of Commissioners may require the developer of a land development to provide emergency signal preemption for any traffic signals located within or immediately adjacent to the development.
3. Submission to Pennsylvania Department of Transportation (PennDOT). The preliminary plan and accompanying improvement construction plans shall not be submitted to the Pennsylvania Department of Transportation until the plans and the traffic management study have been reviewed by the Springfield Township Planning Commission and the Springfield Township Engineer, and approved by the Springfield Township Board of Commissioners. The submittal to PennDOT shall be accompanied by the comments of Springfield Township.

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F. Implementation.

1. Municipal review of traffic management study. The Springfield Township Planning Commission, the Township Engineer and the Board of Commissioners shall review the traffic management study to analyze its adequacy in solving any traffic problems that may occur due to the land development, subdivision or request for rezoning.
2. The Springfield Township Board of Commissioners may decide, after receiving the reports and recommendations of the Planning Commission and Township Engineer, that certain

improvements are necessary and may make these additional improvements to be completed by and at the cost of the developer as conditions to the subdivision, land development or request for rezoning approval.

- G. Waivers. The Springfield Township Board of Commissioners may waive or modify, in whole or in part, the requirement for a traffic management study or any of the requirements and standards set forth in this chapter.

[1] Editor's Note: This ordinance also repealed former Subsection I, Traffic impact studies, added 12-12-2007 by Ord. No. 891.

Section 802. Stormwater Management Reports and Hydrologic Calculations.

- A. The stormwater management report shall be a self-contained report with all calculations and design elements. All plans showing the proposed storm sewer construction must be accompanied by a complete design prepared by a registered engineer. The report shall contain the following elements:
 - 1. Design for Stormwater Control Structures
 - 2. Design of Stormwater Conveyance System
 - 3. Design to Address Stormwater Quality Controls
 - 4. Proposed Stormwater System Management Requirements
- B. Design of Stormwater Control Structures
 - 1. Calculation. The quantity of runoff shall be computed using the following methods for stormwater control structures:
 - a. Natural Resources Conservation Service (NRCS) Soil Cover Complex Method (TR-55 or TR-20 or commercial equivalent) for drainage areas up to 100 acres
 - b. NRCS Soil Cover Complex Method (TR-20 or commercial equivalent) or one of the hydrologic methods implemented in HEC-HMS or HEC-1 for drainage areas over 100 acres.
 - c. A rational hydrograph method (Modified Rational or Universal Rational) may be used for any site equal to or less than 2 acres.
 - d. Other methods as approved by the Township engineer.
 - 2. Assumptions. The following assumptions shall be used in the appropriate stormwater computational method.
 - a. Design runoff hydrographs shall be based upon the most current PennDot regional twenty-four (24) hour rainfall depths or NOAA Atlas 14 data.
 - b. NRCS Type II distribution shall be used to establish the rainfall distribution for stormwater management hydrologic analysis.
 - c. The NRCS dimensionless unit hydrograph "k" factor of 484 shall be used for both pre- and post-development stormwater analysis unless a different value is found to be more appropriate based upon watershed analysis.
 - 3. Stormwater Volume Control design shall be based upon a two (2) year, 24-hour storm event.
 - 4. Stormwater Peak Runoff Control design shall be based upon the one (1), two (2), ten (10), and one-hundred (100) year 24-hour storm events.

C. Water Quality Control

1. Demonstration that the design capture volume is completely removed and 90% of the disturbed area in a site is drained through a water quality best management practice (BMP);
or
2. Computationally demonstrate compliance with the water quality standard by estimating pollutant loadings for the proposed development and pollutant load reductions by selected BMPs.
3. Post-development pollutant loadings shall be computed based upon the land cover classifications and loading rates in the Pennsylvania Stormwater Design Manual or other sources provided by the Township engineer.

D. Stormwater Conveyance Design. The storm drainage system consisting of storm sewer pipes, swales, and open channels shall be based upon the following design standards:

1. Design Frequency. All stormwater facilities shall be designed to transport a ten (10)-year frequency storm. Provision must also be made to transport a 50-year frequency storm so that surface waters will not damage property or flood roads, and that the 50-year frequency storm shall be transported to the appropriate stormwater management facility.
2. The quantity of runoff in conveyance systems shall be computed using the following methods for stormwater control structures:
 - a. Rational Method for drainage areas up to 200 acres in size.
 - b. HEC-1, PSRM, or TR-20 for drainage areas between 200 acres and one-and-one-half (1.5) square miles.
 - c. Over one-and-one-half (1.5) square miles PSU- IV or equivalent.
 - d. Other methods as approved by the Township engineer.
3. Rainfall intensities in the most recent edition of the Pennsylvania Highway Design Manual Part 2 shall be used (PennDot)
4. Rational Method Coefficients shall be based upon the Pennsylvania Highway Design Manual Part 2 or the recommendation of the Township engineer.
5. Hydraulic design computations for stormwater conveyance systems shall follow appropriate methods provided in the NRCS National Engineering Handbook, Part 640, Hydrology, The Federal Highway Administration's Urban Drainage Design Manual, HEC-22, PennDot Design Manual Part 2, the Pennsylvania Stormwater Best Management Practices Manual, or other technical manuals as recommended by the Township Engineer and shall be submitted in a manner acceptable to the Township Engineer. Inlet design data shall be submitted on a separate sheet, on the standard PennDOT design form, or a similar form acceptable to the Township Engineer.

Section 803. Groundwater Study

- A. Purpose. Groundwater studies are intended to determine if there is an adequate supply of water for a proposed use and to estimate the impact of additional water withdrawals on existing nearby wells, underlying aquifers, and streams.
- B. Applicability

1. Since the Township is located within the Southeastern Pennsylvania Groundwater Protection Area of the Delaware River Basin Commission (DRBC), all projects with wells withdrawing 10,000 gallons per day (gpd) or greater of groundwater or surface water or a combination of these two sources are required to obtain a permit from the DRBC. These projects are not required to submit a groundwater impact study; however, copies of all submissions by the applicant to DRBC must be sent to the Township. Additionally, copies of all submissions to the Pennsylvania Department of Environmental Protection (DEP) and all correspondence received by the applicant from DEP shall be forwarded to the Township.
 2. Groundwater studies are required for projects that are not subject to permit or docket approval from DRBC and which fall into one of the following three categories:
 - a. Subdivisions that contain five or more dwelling units and have an overall gross density greater than one house per two acres, excluding residual agricultural lots.
 - b. All land developments intended for nonresidential use (i.e. industrial, commercial, and institutional) unless waived by the Board of Commissioners.
 - c. Subdivisions or land developments taking place in an area with known groundwater contamination or groundwater supply problems as identified in the Township Comprehensive Plan or by another study approved by the Board of Commissioners, or by the Department of Environmental Protection.
- C. Study. The Township will not approve any subdivision or land development where the groundwater impact study shows that the proposed water system:
1. Does not provide an adequate supply of water for the proposed use, considering both quality and quantity.
 2. Adversely affects nearby wells and streams.
 3. Does not provide for adequate groundwater recharge, considering other withdrawals.
 4. Does not provide safe drinking water, taking into account reasonable treatment options.
- D. General Requirements and Standards for a Groundwater Impact Study. All groundwater impact studies must meet the following requirements:
1. The study shall be prepared by a professional hydrologist, geologist, or engineer qualified to conduct groundwater investigations.
 2. A Phase I study shall be conducted for all projects required to do a groundwater study. The Phase I study shall be based upon available literature and appropriate professional judgment and shall include the following information:
 - a. Calculations of the projected water needs using the criteria set forth in the following references:
 - 1) Public Water Supply Manual, Bureau of Water Quality Management, PA Department of Environmental Protection, Harrisburg, PA
 - 2) Guide to Determination of Required Fire Flow by the Insurance Service Office (ISO) as modified.
 - 3) Standards and Manuals for the American Water Works Association, Denver, Colorado.
 - b. A geologic map of the area within a 1.0-mile radius of the site boundary.

- c. The location of all faults, lineaments, and fracture traces within a quarter mile of the site boundary.
- d. The locations of all existing and proposed wells within a quarter mile of the site boundary, and all large withdrawal wells (10,000+ gpd) within 1.0-mile of the site.
- e. The location of all existing and proposed on-lot septic systems within a quarter mile of the site boundary.
- f. The location of all streams, perennial and intermittent, within a quarter mile of the site boundary.
- g. A discussion of the aquifers underlying the site and their long-term drought recharge capability based on accepted published data or detailed site-specific investigation for both the pre- and post-development condition.
- h. Based on the drought recharge capability of the underlying aquifer and the calculated daily groundwater withdrawals of the project, a hydrologic budget shall be calculated for the site and for the area within a quarter mile of the site boundary.
- i. Based on the results of the hydrologic budget, a determination shall be made about adverse effects on the groundwater to be caused by the project. This determination should include an analysis of the total recharge water volume lost to the site as a result of the creation of new impervious surface or modified ground cover found on site. Pumping of groundwater and wastewater disposal must also be evaluated within the hydrologic budget.
- j. Water quality information for area groundwater based on tests of area wells and special groundwater quality issues.
- k. Potential sources of water quality impact such as wastewater treatment systems, industrial sites, landfills, underground storage facilities, surface water infiltration agriculture chemicals, or solid waste disposal facilities existing within a quarter mile of the site boundary should be analyzed. All potential source impacts should include pollutant-loading analysis using an accepted methodology to address metals/ inorganic compounds, hydrocarbons, suspended sediments, nutrients, biological chemical oxygen demand, volatile organics, and fecal coliform.
- l. An estimation of the effects upon the base flow of nearby streams, with special attention given to critical low flow periods.
- m. Average rainfall and storm patterns
- n. The study shall include a brief statement of the qualifications of the person(s) preparing the study.
- o. The study shall consider data and conclusions within the following studies:
 - 1) Special Groundwater Study of the Delaware River Basin Study Area II (Delaware River Basin Commission, 1982).
 - 2) Groundwater Resources of the Brunswick Formation in Montgomery and Berks Counties, Pennsylvania, Bureau of Topographic and Geologic Survey (1965).

- 3) Groundwater Resources of Montgomery County, Bureau of Topographic and Geologic Survey, 1971.
 - 4) Previous reports prepared by other developers in the Township which are determined to be relevant by the Township.
- p. Technical Criteria. A Phase I study shall be prepared and submitted by the applicant, at the expense of the applicant, in compliance with the following criteria:
- 1) The text of the studies shall contain pertinent data, analyses, and methods used to arrive at the report's conclusions. Appendices shall contain raw and summary data.
 - 2) All figures contained within studies shall contain complete legends, titles, and scales.
 - 3) All numerical parameters within studies shall be presented with appropriate units, and all data shall be referenced by sources, data, location, and time, where appropriate.
- q. The Phase I Study should be certified by the licensed hydrogeologist/geologist or sealed by a professional engineer; whoever prepared the study
3. A Phase II Groundwater Impact Study shall be conducted when the results of the Phase I study identify potential water supply problems. The Phase II study shall develop conclusions regarding groundwater impact based upon site investigations. Specific requirements for a Phase II study shall include:
- a. A pump test shall be conducted in the following manner:
 - 1) A step draw down test shall be conducted in accordance with AWWA Standard A100, latest revision. Upon completion of the step draw down test, a 48-hour continuous pump test shall be conducted in accordance with DEP and AWWA A100 standards.
 - 2) The test shall be conducted during a period when no significant recharge has occurred, unless the influence of recharge can be factored out.
 - 3) The test shall include one pumping well (roughly centered on-site) and at least two observation wells. The pumping and observation wells should be located on the same fracture based upon a fracture trace analysis conducted at the site.
 - 4) Analyses shall include all pumping and recovery calculations of hydraulic conductivity (directional) and specific yield, specific capacity and long-term sustainable well yield (tabulated).
 - 5) The test shall be conducted with a pumping rate of 20 percent greater than the proposed peak rate of groundwater use.
 - 6) One pumping test (done separately) shall be required for each 160 acres of the proposed subdivision.
 - 7) Residents of properties within one-half (1/2) mile of the site boundary shall be canvassed to determine if there are any adverse impacts on their wells caused by the pump test.

- b. Samples of water shall be drawn from all test wells on site prior to the termination of the pump test and shall be tested for all parameters required for DEP for the new sources in conformance with their publication "Water Supply Manual" in addition to odor, bacteria-total plate count, total coliform per one-hundred (100) millimeters, and hardness. An analysis of the above listed parameters shall be performed on the samples by a laboratory certified by the DEP. Lab analysis should be performed in accordance with "Standard Methods for the Examination of Water and Wastewater," latest edition.
- c. The Phase II study shall be prepared and submitted to the Township at the applicant's expense. In addition to the information required for the Phase I study, the Phase II study should include the following:
 - 1) Samples and records as required by DEP in the Public Water Supply Manual Part II, Chapter 3.
 - 2) The static water level immediately prior to yield testing.
 - 3) A hydrography of the depth to water surface during test pumping and recovery period at the test well or wells showing the corresponding pump. Based on the drought recharge capability of the underlying aquifer and the calculated daily groundwater withdrawals of the project, a hydrologic budget shall be calculated for the site property itself, and for the area within a quarter mile of the site boundary.
 - 4) A log of depth to water surfaces of existing and monitoring wells during the pump test period showing the times readings were taken.
 - 5) A map illustrating the draw-down effects upon off-site wells and springs located within one-half (1/2) mile distance from the site boundary, indicating draw-downs of one foot or more, occurring during a year with a natural recharge rate of one-year-in-ten frequency.
 - 6) An analysis and interpretation of the impact of the proposed water supply and distribution system on the groundwater supply and existing wells.

Section 804. Community and Fiscal Impact Analysis.

- A. This analysis shall be submitted for land developments involving more than 10 residential units, a building of 10,000 square feet of gross leasable floor area or larger, or when required by the Board of Commissioners. These impact statements must be found to be satisfactory prior to approving the land development.
- B. The analysis shall include the following information:
 - 1. An analysis of the social and demographic characteristics of the proposed development in terms of future residents and users.
 - 2. An analysis of the potential cost/benefits of the development, including a profile of any possible township, county and/or school district revenues that the proposal may generate and any respective costs which it may create.

3. An analysis of the proposed impact of the development on the community's facilities, including schools, parks and recreational areas, libraries, hospitals, fire protection, police protection, and ambulance and rescue services. In the case of parks and recreational needs, the analysis should explain how these needs would be met on-site.
4. Identification of utility needs of the future residents and users of the site, including water supply, sewerage disposal, refuse disposal, storm drainage and electric transmissions. The analysis should discuss:
 - a. The ability of existing utility installations to meet the projected needs of the development.
 - b. The need for additional or expanded utility installations.
 - c. The ability to achieve an adequate system for storm drainage and stormwater management.