

Township Engineering Department - Stormwater, Traffic, Sanitary Sewer and Geotechnical Conditions

Wayne Glen Proposed CU/ Land Development Project

- 1. Required Permits
 - a. Third party permits (PADEP, CCCD, PADOT, etc.) shall be obtained prior to Final Land Development approval, at a minimum these include the following:
 - i. NPDES Permit (PADEP)
 - ii. Chapter 105/106, Dam Safety permits, as related to the proposed stream crossing, stream and floodplain regrading, restoration, and stabilization, floodplain and proposed dam structure (PADEP)
 - iii. Highway Occupancy Permit (PADOT), if necessary.
 - iv. Sanitary Sewer Planning Approval (PADEP)
 - b. Township Permits (to be submitted, reviewed and issued concurrent with Land Development approvals)
 - i. Stormwater and Grading permit (prior to Final Land Development Approval)
 - ii. Road Opening Permit
 - iii. Sewer Connection Permit

- 2. Township Sanitary Sewer Trunk Line
 - a. Access shall be provided to the Township’s sanitary trunk line on both the eastern and western sides of the stream channel. To ensure adequate access for maintenance activities, as well as during flooding conditions access points shall not be located on the dam embankment. Access plans shall be subject to that approval of the Township Engineer prior to Final Land Development Plan approval.
 - b. Access points to internal roadways shall be free of parked cars or other obstructions so as to not limit or restrict access to the Township’s Trout Run Trunk Sewer line. Therefore, there shall be no parking spaces, trees, fire hydrants, etc. blocking these access points, and that should be clearly identified on the plans.
 - c. The access shall be shown on the Conditional Use and Land Development Plans and the location and grades, etc. approved by the Township Engineer and Director of Public Works.
 - d. All existing Township Trout Run Trunk Sewer lines within the proposed development, especially those within the basin, stormwater facilities, or under the roadway, etc. shall be inspected, televised and relined or replaced to ensure they are adequate in regards to watertightness, alignment, and structural integrity, and are not impacted by the proposed development plans, subject to the approval of the Township Engineer.

- 3. Traffic
 - a. Prior to Final Land Development approval(s), the applicant(s) shall comply with the traffic comments in the Orth-Rodgers review letter, dated April 8, 2014.

- b. The applicant(s) shall update the traffic study and/or traffic signal timing modifications at the intersection of Old Eagle School Rd and Swedesford Road, as deemed necessary by the Township Engineer.
 - c. The applicant shall secure all PADOT HOP and Traffic Signal Permits, as necessary, prior to Final Land Development approval by the Planning Commission. Copies of all PADOT permits shall be provided to the Township, as well as noted on the Final Plans to be recorded.
4. Stormwater Management
- a. The applicant shall provide the Township with copies of all stormwater permits and approvals from third party agencies, such as Chester County Conservation District, PA Department of Environmental Protection, ACOE, etc. prior to Final Land Development approval(s) by the Planning Commission. All permit data shall be noted on the Final Land Development Plans that are to be recorded in Chester County.
 - b. The on-site stormwater management features shall maintain positive storage (storage below the lowest outlet) adequate to store the entire runoff volume from the two-year storm in accordance with 208-161.A(3)a.
 - c. For the entire site this storage volume is 157,891 CF (3.62 Ac-Ft).
 - i. For POI#1 (Townhomes) the total volume is 40,985 CF (0.94 Ac-Ft).
 - ii. For POI#2 (Carriage Homes) the total volume is 56,750 CF (1.30 Ac-FT).
 - iii. For POI#3 (Professional) the total volume is 60,156 CF (1.38 Ac-Ft).
 - d. All proposed stormwater management BMPs (Bioretention/ Infiltration Basins, Roadway Porous Pavement/ Underground Infiltration Beds, etc.) used to provide the two-year storage volume shall be equipped with a monitoring well located at an elevation equal to the bottom of the provided two-year storage. The monitoring well shall be accessible by the HOA, the HOA professional engineer, Township, and PADEP to ensure that the storage is empty due to infiltration within a 72 hour period following a storm event.
 - i. If it is determined that the systems are not able to provide adequate drawdown in 72 hours following a storm event, additional infiltration BMPs shall be provided on-site within the same POI to provide an amount of storage equal to that of the system in question. If needed, these additional BMPs shall not impact the proposed peak rate control reduction requirements of regional basin in accordance with 208-161.A(3)c, and be designed and constructed to not impact the approved zoning calculations. These additional BMPs shall also adhere to the Township's loading ratio criteria.
 - e. The on-site stormwater management features shall maintain peak flow reductions at each POI equal to 50% of the baseline peak rate reductions of Chapter 174 in accordance with 208-164.
 - f. All portions of the site which bypass the proposed stormwater management systems shall be maintained in a meadow condition.
 - g. All downspouts shall be directed to pervious lawn areas or sw basin areas and not be directly connected to the pervious pavement/ underground bed proposed BMPs.

Surface grading should be maintained to ensure that downspout flow will reach the intended BMPs without the potential for bypass.

- h. A detailed planting plan shall be prepared prior to final land development approval that details the soil preparation, seeding methods, seeding mix, and planting plan for all stormwater management features, bypass meadow areas and the regional basin.
- i. All off-site areas which are contributory to the site shall be conveyed to the stream in a manner that creates no impacts (flooding, erosion or other impacts) to adjacent properties.
- j. The site shall be equipped with monitoring equipment, especially for the regional basin facility. The details of the monitoring plan shall be submitted to the Township Engineer for review and approval prior to Final Land Development Plan approval.
- k. The applicant shall prepare an executive summary of the site's stormwater management compliance with reference to the Township Stormwater Ordinance, TCO Ordinance, Trout Creek Study, and current state standards.
- l. Given the complexity of the proposed Wayne Glen Stormwater Management and Site Land Development Plan, the applicant shall agree to develop a post-construction stormwater management O&M financial plan, and demonstrate how they and/or the HOA, or other entities will provide for the short and long term operation and maintenance of all the proposed CU stormwater management facilities on the proposed plans. The plan should clearly demonstrate that there will be adequate staff, professional engineering support services, and funding mechanisms in place for both short-term and long-term, routine, as well as all emergency inspection, maintenance and repairs to ensure the safe and efficient and complaint operations of all the proposed site stormwater management facilities. Given that the site is underlain by Karst geology upfront funding should be put aside by the HOA, and future property/home owners for both sinkhole remediation, but even more importantly stormwater facility operation and maintenance (O&M), and further collected by the HOA, and future property/home owners in a quarterly or yearly basis in a manner which identifies it can only be used for stormwater O&M (inspections, routine repair/ maintenance activities, and/or emergency repair/maintenance/replacement, etc.).
- m. During the construction process the applicant shall have a full-time professional engineer conduct inspections and certify that the regional basin, dam, and all other site stormwater management facilities are constructed in accordance with the approved plan, Township, PADEP, and CCCD permit requirements. For inspection purposes, the Township should be kept informed of the progress of the construction process and be made aware of all critical steps during the construction process. A final certification shall be provided by the applicant's professional engineer at the completion of each and all phases of construction.
- n. A detailed Erosion and Sediment Control Plan and a Construction Sequencing Plan shall be provided prior to the issuance of a Township Stormwater and Grading permit, and shall also demonstrate compliance with PADEP and CCCD 102/ NPDES Erosion & Sediment Control requirements.

- i. All proposed stormwater management features shall maintain a minimum two foot thick layer of native soil above the proposed infiltration bed bottom elevation during construction.
- ii. All Bioretention, Infiltration Basins, Roadway Underground Infiltration Systems should not be brought to grade until the drainage area to the basin, bed or systems are fully stabilized. In cases where any BMPs cannot meet this requirement the applicant(s) must submit a request and plan justifying what measures are proposed in the construction sequence, testing, construction methods, oversight, overconstruction/removal, etc., to preserve the permeability of the underlying soils, prohibit soil clogging, and ensure the design compliance is met. This plan must be approved by the Township Engineer prior to Final Land Development approval, as well as by the PADEP/ CCCD.
- iii. The proposed infiltration BMP areas shall be clearly field demarcated to prevent any potential compaction due to construction activities.
- iv. Confirmatory infiltration testing in accordance with the Ch. 174 Township Stormwater Ordinance and PA BMP Manual requirements shall be conducted at the proposed bottom elevation of all stormwater volume reduction/ infiltration systems. Documentation of this testing shall be provided to the Township Engineer prior to construction of those stormwater facilities.
- v. If infiltration testing does not meet the original design values, the applicant shall redesign the impacted stormwater features in order to ensure drawdown and provide on-site compensatory areas, and/or provide a compensatory reduction of site impervious coverage.
- vi. Given that the current commercial development plan is a place holder and is likely to change depending on the future tenant or user of that property, the applicant(s) and/or future applicants will provide at a minimum the required total 2-yr volume control for the Commercial POI#3 regardless of whether or not the site is developed under the Trout Creek Overlay Ordinance or under the by-right zoning, to ensure the level of stormwater management benefits are maximized in the Trout Creek Watershed.
- vii. The applicant shall provide an engineering stormwater management executive summary, as per condition 4(k), which details and documents the measure of benefits, such as reduction in flood water levels at the Point of Interest (POI) at Walker Rd, as well of those benefits downstream at the Glenhardie Road Bridge. Demonstration of benefits should summarize the proposed reductions in flood elevations, roadway overtopping, peak rate and volume for various storm events, velocity, etc. and that there will be no immediate impacts to the downstream adjoining properties.

5. Operations and Maintenance

- a. A detailed Operation and Maintenance Plan shall be prepared for review by the Township, clearly detailing the routine, yearly, and emergency maintenance inspection,

maintenance, and repairs, and reporting to the Township, prior to a Final Land Development approval.

- b. The O&M Plan shall include a plan showing the locations of each basin along with dedicated access routes which demonstrate full access to the perimeter of each proposed SWM facility. Access routes for each facility shall not be encumbered by adjacent residential units or landscaping and should have a min. 10-ft min width with slopes less than or equal to 5:1.
- c. The HOA shall be responsible for the operation and maintenance all stormwater facilities within the town home and carriage home (POI #1 and #2) portions of the site.
- d. The owners and operators of the commercial/ professional portion of the site shall be responsible for the operation and maintenance of all stormwater facilities within the professional portion of the site.
- e. All property owners shall receive a simplified educational packet detailing the property's stormwater management features.
- f. No sand or cinders shall be used for winter road treatment and no landscaping materials (i.e., soils, sands, mulch, etc.) shall be stockpiled on the proposed roadways.
- g. During the construction process the applicant shall have a full-time professional engineer conduct an inspection of the regional basin and dam following any rainfall events greater than one inch. Any observed issues shall be immediately reported to the PADEP, CCCD, and the Township Engineer. Inspection reports shall be provided within one week of the rainfall event.
- h. The HOA shall ensure that the regional basin be inspected on a bi-monthly basis during the initial year of operation. Following that, the HOA shall hire a professional engineer to inspect the dam in compliance with PADEP inspection timeline requirements. The regional basin shall also be inspected after every storm with more than 2.7 inches of rainfall over a 24 hour period. Copies of these inspection reports shall be provided to the Township Engineer, within 14-days of the inspections.
- i. Annual inspection reports completed by a Professional Engineer shall be provided to the Township Engineer on April 1st of each calendar year. The reports shall document any major and all routine inspections, maintenance, and repairs conducted on the regional basin and all private stormwater facilities. The report shall include a list of any outstanding maintenance items, as well as a detailed timeline for completion of any outstanding items.
- j. In addition, to the annual inspection reports the HOA shall maintain up to date contact list with the Township with the responsible parties for operation and maintenance, and provide an updated list of contacts, with email, cell phone, etc. on April 1st of each calendar year.
- k. The HOA and/or owners of the property(s) shall provide the Township copies of all Annual PADEP Dam Safety Inspection Reports, and certification by a Professional Engineer that all required maintenance (routine, non-routine, and emergency, etc.) has been adequately performed to ensure the safe operation of the regional basin and dam impoundment structures. The HOA will also be responsible for any, all inspections of

the culverts, embankments, dam on both the HOA and Township property(s), since they will be integral to the facility and a requirement of PADEP.

6. Geotechnical

- a. Due to the unique combination of high density development and known karst conditions (i.e., sinkholes), this site has a higher than average propensity for the formation of sinkholes. As a result, there shall be financial security in the form of an insurance policy, escrow, and/or funding collected and clearly identified for sinkholes remediation within the HOA fees, specifically to address the costs of sinkhole impacts on the site's infrastructure, including the stormwater management system, roadways, and bridges, etc. The security must also provide provisions to replace the project's stormwater management systems below the roads and in common areas in the event they fail to meet the criteria of peak and volume reductions required by this approval.
- b. The applicant shall provide the Township documentation of all sinkholes and solution features that develop, including location and dimensions, on the Wayne Glen site during construction on the construction as-built plan(s). This information shall include details and documentation of all remedial actions taken for each feature.
- c. Special foundation considerations, where merited by sub-surface conditions, shall be indicated on the plans and applications submitted to the Township for all future building and zoning permits. Examples of considerations include grouting, deep dynamic compaction, grade beam or mat design of foundations and, if necessary, piles to support grade beam structural foundations.
- d. The Operations and Maintenance (O&M) manual should include sections regarding industry accepted best management practices within carbonate geology, and industry accepted protocol for addressing subsidence activity that becomes evident during the life of the project. Inclusion in the O&M manual would be a listing of allowed and prohibited karst remediation techniques (i.e., remediation methods that would impair the function of proposed stormwater infiltration facilities and underground stone beds in the roads). This document shall also include a notification list when a sinkhole occurs that includes an on-call geotechnical engineer under contract with the HOA and notification to the PADEP and Township Engineer.
- e. A statement shall be included in the property deed, and HOA documents stating that that homes and development are located on a carbonate formation. The documentation should also include the industry accepted and best management practices for managing the risks associated with development in active karst areas.
- f. All stormwater pipe and connections must be provided with watertight gaskets.
- g. Backfill of utility conduit and pipe (including, but not limited to sewer and stormwater) shall not use coarse bedding material, but rather use native material.
- h. The Township shall have unrestricted access during construction for inspection purposes. The Township shall be notified prior to the completion of any Karst-related remedial efforts.

- i. In the case that additional sinkholes or solution features are uncovered within the limits of infiltration facilities during construction, the applicant(s) shall revise their stormwater management plan(s) to remediate the discovered feature(s) in method which maintains the BMP's proposed stormwater volume, rate, and water quality benefits in the approved plans. These plan(s) shall be submitted to and approved by the Township Engineer. In cases where these feature(s) in BMPs cannot be remediated in a method that preserves the quantified stormwater benefits the applicant shall relocate the affected stormwater BMP, propose alternative solutions acceptable to the Township Engineer, and/or provide a compensatory reduction of impervious surface to compensate for the loss of any required infiltration volumes.