

October 7, 2024

615 Waterfront Drive | Suite 201
Allentown, PA 18102

RE: Stormwater Review
Easton Commerce Park – Land Use of Regional Significance
Wilson Borough, City of Easton and Palmer Township
Northampton County

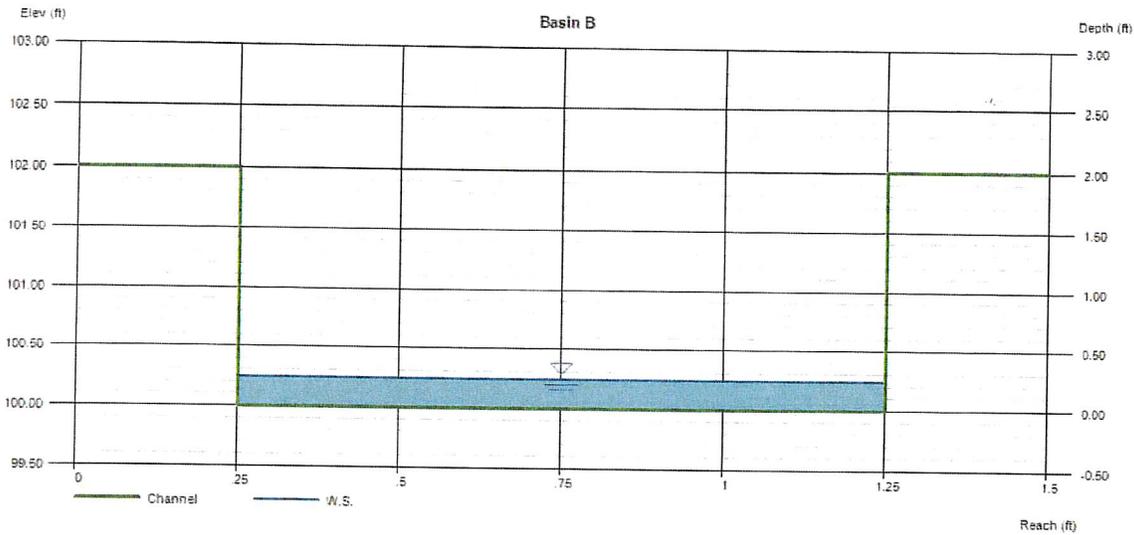
Comments from LVPC regarding stormwater received in Attachment 1 (Act 167 Drainage Plan Review) on August 29, 2024 are in *Italic* and responses by Bogia Engineering are in **Bold**.

- ❖ *Areas draining to on-site closed depressions need to be evaluated for runoff impact in the pre development condition.*

The evaluation of these depression was modeled and is presented as a component of this resubmission package. The existing site was evaluated to determine the low land areas (i.e., depressions) that could potentially hold stormwater runoff temporarily in the pre-development condition. Drainage areas associated with these topographic depressions were delineated and categorized. The highest possible storage volume for each of these depressions were then estimated by assuming 0.5' of bowl-shaped areas as well as 1 foot of topsoil with 33% void space. It was shown that in most cases, stormwater runoff will quickly fill up these depressions and would then overflow, continuing toward the discharge point of the larger drainage areas that these depressions are a part of. In case of significance of existing storage volumes provided by depressions in storing stormwater runoff, it was shown that the contribution of these areas is smaller than what it takes to impact the larger drainage area peak (and the entire site) rates in the pre-development condition. Please see the separate analysis included in this resubmission package.

- ❖ *The outfall pipes from basins A and B are creating concentrated discharge points. Given the slope and distance to be traveled by the discharge at these two points, stable conveyance should be provided downstream to Basin C.*

The outfall pipes from basins A and B would discharge over riprap aprons installed upslope of the basin C. The riprap aprons are designed for 100-yr storm and the calculations and details are presented in the PCSM and E&SC reports and drawings. It should be noted that the riprap aprons were initially designed for significantly higher discharge rates, which decreased as a result of revisions made to BMP sizes and specifications. Nonetheless, the riprap design did not change to keep it as a conservative design. The latest revision of BMPs and stormwater modeling (as presented in Appendix G of PCSM report) shows that 100-year peak rate discharging from basins A and B are 1.13 cfs and 2.24 cfs, respectively, while both riprap aprons were designed for around 20 cfs. As



Depth (ft)	Q (cfs)	Area (sqft)	Veloc (ft/s)	Wp (ft)	T/c (ft)	TopWidth (ft)	Energy (ft)
0.24	0.370	0.240	1.54	1.48	0.17	1.00	0.28

Therefore the flow bed velocities of the sheetflows would be:

Downgradeint of basin A: $(0.18 \text{ cfs/ft}) / (0.15 \text{ ft}) = 1.2 \text{ fps}$

Downgradeint of basin B: $(0.37 \text{ cfs/ft}) / (0.24 \text{ ft}) = 1.5 \text{ fps}$

The calculated bed velocities for both cases are below the allowable velocities for all soil textures. It should be noted that the proposed land cover downstream of these discharge points is open space lawn. This area would be permanently stabilized by mulching, seeding and vegetation. Nonetheless, the soil texture (i.e., topsoil composed of sandy loam) just by itself can withstand the highest bed velocity and shear stress per published table in PADEP E&SC manual.

- ❖ *Time of concentration calculations need to be revised to use a maximum length of sheet flow of 150 feet.*

Addressed through revising all the sheet flows that exceeded 150'. The remainder of the time of concentration paths were added to concentrated flow where applicable. These are included in the appendix G of the updated PCSM report.

- ❖ *Shallow concentrated time of concentration calculations need to be broken down into segments that have the same land cover type and shall be calculated where there are significant changes in slope.*



BOGIA ENGINEERING INC.

1340 Penn Avenue
Wyomissing, PA 19610
T: 610-678-3071
F: 610-678-3517
www.bogiaeng.com

Per PADEP MRC BMP manual, volume storage below the first orifice (i.e., the underdrain orifice) makes the IWS layer, and 50% of the fill media void can be used in the routing calculations. Additionally, PADEP PCSM spreadsheet allows gaining ET credits for vegetated MRC basins (this is not considered in routing). Nonetheless, the storage volume provided by IWS was excluded in the basin routing to address this comment. To avoid preparing different versions of PCSM report for various reviewing agencies, modified BMP modeling and corresponding results are added as Appendix G of PCSM report. This appendix also includes all the revisions regarding drainage areas and time of concentrations discussed in the previous comments. As it is shown the post-construction stormwater would still meet the requirements after hydrograph modeling revisions.

❖ *The calculations need to demonstrate that the watercourse easement provided is sized to provide for the 100-year runoff plus a freeboard allowance of 0.5 feet.*

The proposed plans are updated to delineate the easement area around the proposed channel that includes 100-year floodplain plus 0.5' of additional freeboard. Calculation to delineate this area was performed by first computation of 100-year floodplain (as reported previously in H&H report) and then use the coding feature of RAS MAPPER in HEC-RAS to add 0.5' to the calculated flood elevation. The elevated floodplain was exported from RAS MAPPER into Civil 3d. This area represents the area that can be inundated when 0.5' is added to the calculated floodplain. The easement is shown on sheets 10 and 11 of the PCSM drawing set. This HEC-RAS modeling is included in this resubmission package.

If you have any questions, please do not hesitate to call me at 484-872-8886.

Sincerely,

Donald Haas, RLA, ASLA, CBLP
Branch Manager