BEI
BOGIA ENGINEERING INC.

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New

JAN 31 2025

January 31, 2025

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 January 22, 2025 are in *Italic* and responses by Bogia Engineering are in **Bold.**

- *Clear mapping of the existing closed depression contours needs to be provided to verify their locations and storage volumes.*

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.

There are several areas enclosed by the existing contours, however, only three of them (shown in blue hatch in the attached plan) are depressions and the rest of them (shown in red hatch) are elevated spots. Two site maps are presented in this resubmission package; one shows the drainage areas associated with each depression (note that they are part of larger drainage areas as noted in the plans and associated narrative) and the second one is only showing depressions to make them easier to observe. The existing contours that led to these determinations are also displayed on the plans.

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 runoff values for all pre- and post-development subareas are higher in this submission because the designed used SCS Type II distribution compared to local distribution was used in prior submission.

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- *Hydrograph routing through the closed depressions needs to be provided to define the impact on pre-development peak runoff.*

Please see response to the previous comment. The analysis of existing depression report is presented as a standalone document as a component of this resubmission package.

- *The managed release concept basin should be routed from the first orifice elevation.*

The storage volume below the lowest orifices is disregarded to address this comment although per DEP MRC manual, we may use 50% of that storage volume. Nonetheless, please see the standalone document that shows the routing begins at the lowest orifice elevation. To clarify, below is a presentation of how basins are modeled: OK

<u>BASIN A modeling</u>
The initial model using the contour area of 79,915 sq. ft. for the basin bottom as well as the top of fill media (i.e., contour 290.00').

1.0' is removed (i.e., zero storage volume) from the routing, from 288.00 to 289.00 where the lowest orifice (underdrain orifice) is installed.

FHA orifice 3.5 inches @ 289 23,794

1.0' is 30% void space, from 289.00 to 290.00 with an area of 79,915.
79,915 x 1 x 30% = 23,974 cu. ft.

This was then approximated by artificially adjusting the contour areas to achieve the noted volumes. Some volume was not utilized leaving the calculations slightly conservative. The remaining contours are reflective of the surface design conditions.

Pond Name: BMP A

Row	Stage	Elevation	Contour Area	Incremental Storage	Total Storage
	(ft)	(ft)	(sqft)	(cuft)	(cuft)
0	0.00	288.00	0	0.000	0.000
1	2.00	290.00	35,965	23,974	23,974
2	2.01	290.01	79,915	565	24,539
3	4.00	292.00	88,068	167,061	191,600
4	6.00	294.00	96,468	184,454	376,054
5	8.00	296.00	105,115	201,501	577,555
6					
7					

Fill

Soil storage above IWS = 30% of 79,515 =

290	79,515	0	0
292	88,068	167,413	167,413
294	96,468	184,536	351,679
296	105,115	201583	553,262

+ 23,855
577,117

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284-85 — IWS
~~285-92 Ach Storage~~
285-286 — Soil above IWS
286 - 292 — Ach bottom

BASIN B modeling

The initial model using the contour area of 76,441 sq. ft. for the basin bottom as well as the top of fill media (i.e., contour 286.00').

first orifice @ 285

1.0' is removed (i.e., zero storage volume) from the routing, from 284.00 to 285.00 where the lowest orifice (underdrain orifice) is installed.

1.0' is 30% void space, from 285.00 to 286.00 with an area of 76,441.
76,441 x 1 x 30% = 22,932 cu. ft.

This was then approximated by artificially adjusting the contour areas to achieve the noted volumes. Some volume was not utilized leaving the calculations slightly conservative. The remaining contours are reflective of the surface design conditions.

Pond Name: BMP B

Row	Stage	Elevation	Contour Area	Incremental Storage	Total Storage
	(ft)	(ft)	(sqft)	(cuft)	(cuft)
0	0.00	284.00	0	0.000	0.000
1	2.00	286.00	34,400	22,931	22,931
2	2.01	286.01	76,441	540	23,471
3	4.00	288.00	87,488	162,969	186,441
4	6.00	290.00	95,788	183,195	369,636
5	8.00	292.00	104,371	200,078	569,713
6					

Fill

285-286 30% * 79,461 = 22,932

286 - 292 Storage Ach = 546,544

Σ total = 569,477
(569,713 used)

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OK

BASIN C modeling

The initial model using the contour area of 115,916 sq. ft. for the basin bottom as well as the top of fill media (i.e., contour 216.00').

3.0' is removed (i.e., zero storage volume) from the routing, from 212.00 to 215.00 where the lowest orifice (underdrain orifice) is installed.

1.0' is 30% void space, from 215.00 to 216.00 with an area of 115,916.
115,916 x 1 x 30% = 37,774 cu. ft.

This was then approximated by artificially adjusting the contour areas to achieve the noted volumes. Some volume was not utilized leaving the calculations slightly conservative. The remaining contours are reflective of the surface design conditions.

Pond Name: BMP C

Row	Stage	Elevation	Contour Area	Incremental Storage	Total Storage
	(ft)	(ft)	(sqft)	(cuft)	(cuft)
0	0.00	212.00	0	0.000	0.000
1	4.00	216.00	28,333	37,774	37,774
2	4.01	216.01	115,916	672	38,445
3	6.00	218.00	126,194	240,803	279,248
4	8.00	220.00	136,697	262,795	542,043
5	10.00	222.00	147,725	284,322	826,365
6	12.00	224.00	158,385	306,018	1,132,383
7					

Fill

1.5" orifice @ 215

212 to 215 – IWS Storage Ignored

215 to 216 – Soil Storage above IWS = 115,916 x 30% = 34,775

216 to 224 – AGBasin Storage = 1094,322

Total Storage = 1,129,097 cf

1,132,383 cf USED

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OK

BASIN E modeling

The initial model using the contour area of 8,762 sq. ft. for the basin bottom as well as the top of fill media (i.e., contour 256.00').

3.0' is removed (i.e., zero storage volume) from the routing, from 252.00 to 255.00 where the lowest orifice (underdrain orifice) is installed.

1" orifice @ 255
255 - 225 INS Ignored

1.0' is 30% void space, from 255.00 to 256.00 with an area of 8,762.
8,762 x 1 x 30% = 2,629 cu. ft.

This was then approximated by artificially adjusting the contour areas to achieve the noted volumes. Some volume was not utilized leaving the calculations slightly conservative. The remaining contours are reflective of the surface design conditions.

Pond Name: BMP E

Row	Stage	Elevation	Contour Area	Incremental Storage	Total Storage
	(ft)	(ft)	(sqft)	(cuft)	(cuft)
0	0.00	252.00	0	0.000	0.000
1	4.00	256.00	1,972	2,629	2,629
2	4.01	256.01	8,762	49.6	2,679
3	6.00	258.00	11,385	19,987	22,666
4	8.00	260.00	14,240	25,569	48,235
5	10.00	262.00	17,331	31,517	79,753
6					

Fill

255 - 256 30% Soil Storage = 8,762 x 30% = 2,629
256 to 262 AG Storage = 77,143
Total Bsin Storage = 79,741 (79,753 Vol)

❖ *The time of concentration calculation for area PR Bypass 3 needs to be revised to use a maximum length of sheet flow of 150 feet.*

Addressed through revising the time of concentration associated with PR-BYPASS 3. Please note that the total length of this time of concentration path is 247', as displayed on the plans. It was supposed to be split between sheet flow and concentrated flow in a way that 150' be allocated to sheet flow and 97' to concentrated flow. 97-foot was allocated correctly but we missed to deduct it from the entire path to bring the sheet flow path down to 150'. It is now revised in the updated report. Nonetheless, the total path is 247' and the revised version did not impact the overall analysis. It should be noted that calculated time of concentration for this drainage area falls below minimum of 6 minutes but we kept the calculated value to address this comment that would make a more conservative scenario (because it results in higher post-construction peak from that area).

4 9min Used - Conservative in Post-dev

OK

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- *The outlet control structure details for best management practices need to be refined.*

The details shown on the PCSM drawing set were updated but we missed updating the details on the holistic drawing set of the site. This comment is addressed in the updated drawing set for the whole site.

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

Sincerely,

Donald Haas, RLA, ASLA, CBLP
Branch Manager

Please call if there are any questions. We are more than happy to make a review simpler