

Engineering has reviewed the plans for the Woodfield Wilmington project submitted February 3, 2017 and have the following comments:

**Stormwater Management Permit Application Form**

1. IV. Project Information; Line Item #9:
  - a) If taking credit for pervious pavement, the credit to be applied is 75% for HSG 'A' soils instead of 70%. How much total square footage of pervious pavement is this project proposing? List 25% of the total as pervious pavement under Line Item #9.
  - b) The Total Onsite Newly Constructed Impervious Surface listed in Line Item #9 does not appear to match the information provided in the Site Data Table listed on sheet 8 (CS-101-Overall Site Plan). Please verify and revise appropriately.
2. IV. Project Information; Line Item #12: The Total Offsite Newly Constructed Impervious Area listed in Line Item #12 does not appear to match the information provided in the Site Data Table listed on sheet 8 (CS-101-Overall Site Plan). Please verify and revise appropriately.
3. IV. Project Information; Line Item #13: This may change based on previous comments.
4. IV. Project Information; Line Item #14:
  - a. Revise Stream Classification to C;Sw instead of C;Cw.
  - b. Enter the Total Impervious Area for each BMP. Take note that the pervious concrete number needs revising.
  - c. Add '75% Credit' to the right of Pervious Pavement (sf).
  - d. Since pervious credit for 'A' soils is 75%, enter 25% of the total amount of pervious concrete for each BMP (1-3,761; 2-5,155; 3-2,081).
  - e. Adjust the Percent Impervious Area (%) for each BMP.
5. VII. Property Owner Authorization: the notarized portion of page 7 of 7 for this section was not completed.

**Stormwater Management Design Narrative**

6. IV. Stormwater Control Measures:
  - a. Revise first paragraph claiming 70% impervious surface reduction to 75%.
  - b. Provide summary for 2 and 10-year pre/post-development peak flows.
7. D. Calculations: Per the Section 18-761 of the Technical Standards, the city considers pre-development state to be woods in good condition for the purpose of determining runoff coefficients. 30 is the CN for 'A' soils in a woods good state, but the city has allowed a CN of 39. You can revise to a 39 or stay with 36, but the 'Fair Condition' needs to be revised to 'Good Condition'.
8. Pond Calculations (all ponds): Provide a line item for the Pervious Pavement under the Impervious breakdown. Basically, keep separated impervious pavement from pervious pavement.
9. Pond #1 (NC DEQ Retention Requirements):
  - a. What is the pond bottom and sediment storage elevation of the main bay? The calculations do not appear to match the plans.
  - b. Please provide the average depth calculation for the pond for verification of average depth calculated, provided, SA/DA ratio and PP surface area required.
  - c. It appears that the Permanent Pool Volume includes the sediment storage in the volume. The sediment storage volume should be excluded. Please revise.
  - d. It appears that the Provided Volume-Forebay does not exclude the sediment storage. Please revise.
  - e. Provide drawdown calculations for both the 1.5" treatment volume and the temporary pool volume since you are providing additional volume above the 1.5 treatment volume

- elevation. The drawdown time for the 1.5" must be between 2 and 5 days and the drawdown time for the temporary pool must be less than 5 days.
- f. Main Bay Stage-Storage: There appears to be an error in the cumulative volume calculation starting in the cell for elevation 6.00'. There are two successive 7,600 cf volumes.
10. Pond #2 (NC DEQ Retention Requirements):
- Verify Sediment Storage Volume. It appears that the cumulative volume for the Total (main bay + forebay) is not being calculated correctly.
  - Please provide the average depth calculation for the pond for verification of average depth calculated, provided, SA/DA ratio and PP surface area required.
  - It appears that the Permanent Pool Volume includes the sediment storage in the volume. The sediment storage volume should be excluded. Please revise.
  - It appears that the Provided Volume-Forebay does not exclude the sediment storage. Please revise.
  - The forebay appears to be too large and exceeds the 22% maximum. Please verify.
  - Provide drawdown calculations for both the 1.5" treatment volume and the temporary pool volume since you are providing additional volume above the 1.5 treatment volume elevation. Verify the drawdown time for the 1.5" will be between 2 and 5 days and the drawdown time for the temporary pool will be less than 5 days.
11. Pond #3 (NC DEQ Retention Requirements):
- Bottom of Pond Elevation-Forebay and Sediment Storage Elevation-Forebay don't match the plans. Please revise.
  - Please provide the average depth calculation for the pond for verification of average depth calculated, provided, SA/DA ratio and PP surface area required.
  - Verify the provided PP surface area. 4,566 sf does not match the stage-storage calculations.
  - It appears that the Permanent Pool Volume includes the sediment storage in the volume. The sediment storage volume should be excluded. Please revise.
  - It appears that the Provided Volume-Forebay does not exclude the sediment storage. Please revise. Check that the forebay will still meet the percentage requirement as well.
  - Provide drawdown calculations for both the 1.5" treatment volume and the temporary pool volume since you are providing additional volume above the 1.5 treatment volume elevation. Verify the drawdown time for the 1.5" will be between 2 and 5 days and the drawdown time for the temporary pool will be less than 5 days. Verify the weir elevation and the Total Elevation Head. Make sure the cells equations are accurate.
  - The surface areas of the forebay and main bay at the permanent pool elevation do not equal the surface area used for the permanent pool. Please revise.
12. Hydrograph Report: The rain depth for the 2-, 10-, 25-, 50- and 100-year can be found in Chart E-5 of the city's Technical Standards and Specifications Manual. IT appears you used the Intensity Chart E-6.
13. As mentioned in our phone conversation, the city allows the use of curve number 39 for pre-development woods in good condition with 'A' soils. You used 36, which is acceptable, but to create a fairer pre-development peak flow discharge rate the city allows 39.
14. HH Pond #1 Pond Report:
- Verify length and slope of 24" RCP outlet pipe. This should match plans.
  - Verify the crest length of the outlet structure. HH has it at 16', plans indicate 12' at elevation 13.00'.
  - Verify Multi-Stage components of outlet structure.
  - Exfiltration is not allowable when routing ponds. Please revise to zero.
15. HH Pond #3 Pond Report:

- a. Stage/Storage table (contour areas) should match stage/storage in calculations.
  - b. Verify length and slope of 15" RCP outlet pipe. This should match plans.
  - c. Verify the diameter of the low flow orifice. This should match plans.
  - d. Verify the crest length of the outlet structure. HH has it at 16', plans indicate 12' at elevation 19.20'.
  - e. Exfiltration is not allowable when routing ponds. Please revise to zero.
16. HH Pond #2 Pond Report:
- a. Stage/Storage table (contour areas) should match stage/storage in calculations.
  - b. Verify length and slope of 24" RCP outlet pipe. This should match plans.
  - c. Verify Multi-Stage components of outlet structure.
  - d. Verify the crest length of the outlet structure. HH has it at 16', plans indicate 12' at elevation 15.75'.
  - e. Exfiltration is not allowable when routing ponds. Please revise to zero.
17. Pond #1: Something isn't right about the 50-year Routing with principal spillway obstructed. The 50-year working properly had a max. elevation of 13.17ft. The obstructed model has a max. elevation of 11.67ft. Please verify. Check all three ponds just to be sure the routing is correct.
18. Piped collection systems shall be designed for the 10-year frequency storm event and analyzed for the 50-year frequency event to check the system for flooding. Please provide 10 and 50-year HGL for piped systems.
19. Verify the pipe length between CB-201 and CB-202. Calcs show 15', plans show 28'.
20. Verify the slope for Pond #1 24" RCP Outlet energy dissipater.
21. Provide any required calculations for the permeable pavement, i.e. stone base and drawdown time.

#### **Wet Detention Basin Supplements**

22. All Supplements:
- a. II. Design Information; Site Characteristics: Update the Impervious area, post-development square footage using the 75% credit for the PP.
  - b. Recheck entire supplement based on earlier review comments.
  - c. Note: Area, sediment cleanout, top elevation (bottom of pond) is the area of the main pond only, see Fig. 10-2b in the state WDB Supplement located on NCDEQ's website.
  - d. Note: you must round down to the nearest 0.5 ft to determine average depth used.
  - e. See Figure 10-2b for term definitions used in average depth determination.

#### **Operation & Maintenance Agreements**

23. No Comments.

#### **Stormwater Submittal Plans**

##### **General**

24. Please use the most current stormwater approval block on all sheets in the plan set. The block is located on the city website at the following link:  
<http://www.wilmingtonnc.gov/departments/engineering/plan-review-section/stormwater-permits>
25. Woodfield Apartments must coordinate with the City regarding the connections to and subsequent widening of Independence Boulevard, including sidewalk within Independence Boulevard r/w. Current submittal set lacks construction plans for connection to Independence Boulevard.
26. The Conservation Resource delineated on the plans is labeled a Freshwater Swamp Forest (Non-tidal). The City's Conservation Resource Regulations require only a 25 foot setback from the Conservation Resource. The 50 foot wetland buffer can be deleted. The 25 foot undisturbed vegetated buffer should be revised to a 25 foot vegetated setback. The 25 foot setback should

remain undisturbed as much as possible, but disturbing inside the setback is allowable, i.e. pond bank grading and grading for the pond outlet pipe installation. I would just caution about the removal of trees inside the setback.

**Cover Sheet**

27. Update the Project Engineer/Representative portion on this sheet.

**CE-102 (S&EC Plan-Ph. 2)**

28. The construction sequence needs to address the installation of pervious concrete and outline means for protection of these areas to ensure the PC will operate after project completion. See permeable pavement section in NCDEQ Stormwater Design Manual.

**CS-101 (Overall Site Plan)**

29. Note 11 under General Notes: All variance requests must be submitted in writing. Please see Chapter 18, Section 18-348 of the Land Development Code.

**CS-102 & CS-103 (Enlarged Site Plans)**

30. All pervious areas need to have edge restraints shown between the conventional asphalt and pervious concrete. Add edge restraint detail to detail sheet.

**CG-101 (Overall Grading Plans)**

31. FFE elevations for buildings are not at a legible scale.

**CG-102 thru CG-105 (Grading Plans)**

32. Please provide drainage areas for each Pervious Concrete area. The maximum ratio of additional built-upon area that may drain to permeable pavement is 1:1. Drainage areas that exceed the 1:1 ratio must be revised. It is preferable to keep the permeable pavement out of the low areas (sag conditions) and to relocate the pipe system inlets out of the permeable pavement and into the drive aisles and/or conventional asphalt parking areas. Permeable pavement would be best located at the upper end of a drainage area where the drainage area of the PC is no more than the footprint of the PC. Stone base thickness will need to be calculated for each PC section.

33. Provide sufficient spot elevations along proposed sidewalk within r/w to demonstrate ADA compliance and constructability.

34. Runoff from adjacent pervious areas shall be prevented from reaching the permeable pavement except for incidental, unavoidable runoff from stable vegetated areas.

35. CG-103:

- a. Provide more finished grade contour labels for Pond #1, both inside the pond and out.
- b. Can the angle of the inlet pipe into the Pond #1 be revised to better work with the wall it has to protrude thru? Remove the FES at the entrance to the forebay.
- c. Please provide spot grades for the pool area. How will the runoff be collected in this area?
- d. Please look at revising the grading around Pond #2 to remove the retaining wall. Grading inside the 25' maximum encroachment may be allowed per the Conservation Resource Regulations (Article 6; Division III of the LDC) to avoid constructing the wall. The wall is needed to avoid removal of large trees?

36. CG-104: The angle made by CB-206, CB-205 and CB-207 is too severe. Please revise.

37. CG-105:

- a. CB-300, which should be a drop inlet, cannot be located under the compactor. Please move this structure out towards the drive aisle.
- b. If a retaining wall is necessary, can you put the wall on the 25' maximum encroachment line to minimize the height of the wall?

**CG-106 (Overall Storm Drainage Plan)**

38. Where is the roof leader pipe system information, i.e. sizes, lengths, material, etc.? Please add to plans.

39. Label the pipe outfalls at the forebays.

**CN-501 (Storm Drainage Details)**

40. Please provide all appropriate details to support proposed site construction and stormwater management systems. City standard details must be the latest pdf version downloaded from the city website.

**CN-501 (Stormwater Management Details)**

41. Pipe Outlet Protection detail may need updating based on earlier comments for energy dissipaters.

42. Show the riprap limits (hatching) on the forebay berm wall in the plan view.

43. Provide a detail for the baffle wall.

44. Is retaining wall adjacent to building long enough? It appears that the wall must be extended to catch 3:1 slopes.

45. Proposed contours on exterior of pond do not look to be correct.

46. Extend emergency spillway riprap down to natural grade. Grade in the emergency spillway.

47. Pipe invert elevation must be lower than the exit elevation. The pipe invert is 9.00'. The forebay berm wall top is at 9.00'.

48. The forebay berm wall needs to be labeled that it is a retaining wall.

49. Per the MDC, the vegetated shelf can be 6' instead of 10'.

50. Correct the slope of the outlet pipe in the cross-section.

51. Per the technical standards (Ch. V.D.4.g and h), please provide the 10' maintenance access and 5' landscape zone around the periphery of the pond. How are maintenance vehicles to gain access to the ponds? Please submit the landscape plan for review of the plantings required around the periphery of the pond.

52. The pond outlet pipe does not appear to daylight. Where is the 10' contour elevation in relation to the FES and energy dissipater?

53. Add more proposed contour labels to the plan view.

**CN-502 (Stormwater Management Details)**

54. Show the riprap limits (hatching) on the forebay berm wall in the plan view.

55. Proposed contours on interior of pond (permanent pool elevation) do not look to be correct. It doesn't match up with the cross-section.

56. Extend emergency spillway riprap down to natural grade. Grade in the emergency spillway.

57. Pipe invert elevation must be lower than the exit elevation. The pipe invert is 13.00'. The forebay berm wall top is at 12.50'.

58. Per the MDC, the vegetated shelf can be 6' instead of 10'.

59. Per the technical standards (Ch. V.D.4.g and h), please provide the 10' maintenance access and 5' landscape zone around the periphery of the pond. How are maintenance vehicles to gain access to the ponds? Please submit the landscape plan for review of the plantings required around the periphery of the pond.

60. The cross-section shows a 15' wide top of pond at elevation 16.75, where does this occur? The plan view does not match cross-section. Provide a cross-section showing how the retaining wall along the northern side of the pond will be constructed.

61. Add more proposed contour labels to the plan view.

**CN-503 (Stormwater Management Details)**

62. Show the riprap limits (hatching) on the forebay berm wall in the plan view.

63. Label the conservation resource setbacks.

64. Add more existing and proposed contour labels to the plan view.

65. Proposed contours on interior of pond (permanent pool elevation) do not look to be correct. It doesn't match up with the cross-section.
66. Extend emergency spillway riprap down to natural grade. Grade in the emergency spillway.
67. Pipe invert elevation must be lower than the exit elevation. The pipe invert is 17.25'. The forebay berm wall top is at 16.50'.
68. Per the MDC, the vegetated shelf can be 6' instead of 10'.
69. Per the technical standards (Ch. V.D.4.g and h), please provide the 10' maintenance access and 5' landscape zone around the periphery of the pond. How are maintenance vehicles to gain access to the ponds? Please submit the landscape plan for review of the plantings required around the periphery of the pond.
70. It is difficult to tell if the proposed grading on the northern side of the pond will work or not. Is there a pond wall with any width to it? Please provide more detailed grading of the pond.

**CL-102 (Stormwater Pond Shelf Landscape Plans and Details)**

71. Shelf plantings cannot be within 10 feet of the outlet structures.

Please submit one complete set of plans, application, supplements, narrative, calculations and any other supporting documentation to Engineering for additional review. Please call or email if there are any questions. Thank you.